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ROYAL BOTANIC GARDENS, KEW

XIV.—SOME INDIAN RHODOPHYCEAE, ESPECIALLY FROM THE SHORES OF THE PRESIDENCY OF BOMBAY. II.*

F. Boergesen.

Erythrotrichia carnea *J. Ag.*, Till Algernes Systematik vi. 1883, 15; Rosenvinge, Mar. Alg. Denm., part i. 1909, 67, fig. 8.—*Conferva carnea* Dillwyn, Brit. Confervae, 1809, pl. 84.—*Conferva ceramicola* Lyngb., Hydrophyt. Dan. 1819, 144, pl. 48 D. *Erythrotrichia ceramicola* Aresch., Phyc. Scand., 1850, 210; Berthold, Bang. Golf. Neapel, 25.

This species was found as an epiphyte upon the lower stems of *Chondria cornuta* sp. nov. and on *Haloplegma Duperreyi* cast ashore at Okha Port. The Indian specimens, which were fructiferous, agree well with the descriptions of Berthold and of Rosenvinge. The filaments are about 14–22 μ thick.

India: Okha Port; Santa Cruz, near Bombay.

Distr. Atlantic Ocean, Mediterranean Sea, Malayan Archipelago, Pacific coast of America.

Fig. 1. *Acrochaetium erectum* Boergs. Three plants with monosporangia (×250).

*Continued from *K.B.* 1931, p. 24.

Acrochaetium erectum *Boergs.*, sp. nov. ; *A. Dufourii* Collins proximum, quod tamen filamentis erectis pluribus, thallo magis racemoso, cellulis brevioribus, sporangiis brevioribus et crassioribus praecipue distinguitur.

Thallus usque ad 400–500 μ altus e cellula basali oritur filum emittente erectum plus minus ramosum e cellulis cylindricis 5 μ latis et 12 μ longis compositum. *Rami* sparsi aut secundati, rarissime oppositi. *Chromatophorum* parietale, pyrenoide laterali instructum. *Sporangia* sessilia aut pedicellata, ellipsoideo-subcylindrica, 10 μ longa, 5 μ lata.

India. Dwarka, upon *Agardhiella robusta*, *Boergesen* 5431 (type).

The basal cell (Fig. 1) is partially immersed in the thick cuticle of the host and is usually a little longer than broad, namely 8–9 μ long and 5–6 μ broad. I have always found only a single erect stem from the spore. In most cases this erect stem is not ramified below and many of the specimens consist only of the short main filament from which a few sporangia or quite short branches are given off. The ramification is alternate or secund : I have only once seen two pedicels with sporangia given off oppositely from the same cell. The sporangia are sessile or pedicellate, oblong-cylindrical, 4–5 μ broad, 10–11 μ long.

Of the many small species of *Acrochaetium* with a single basal cell, our plant is especially reminiscent of *A. Dufourii* Collins growing on *Sargassum* (Rhodora, vol. xiii, 1911, 187 ; compare Hamel, in Revue Algolog., 1926, 111, fig. 18), but this is a more branched plant with several erect filaments of shorter cells, and with shorter and thicker sporangia.

Acrochaetium dwarkense *Boergs.*, sp. nov. ; *A. macropodi* Kylin verisimiliter proximum, quod tamen praeter alia ramis saepe alternantibus, chromatophoro stellato, sporangiis sessilibus (rarissime pedicellatis), pilis praesentibus a nostra specie distinguitur.

Thallus epiphyticus, ad 500 μ altus, e cellula basali globosa 9–10 μ lata et filis erectis (1–pluribus) compositus. *Fila erecta* opposite ramosa, in superiore parte ramorum plus minus unilateraliter ramosa, e cellulis in inferiore parte 6–7 μ latis 10–13 μ longis, in superiore 3–4 μ latis sistentia. *Chromatophorum* parietale, lobatum, pyrenoide minore laterali munitum. *Monosporangia* ovato-globosa, pedicellata aut sessilia, 5 μ lata, 6–7 μ longa.

India : Dwarka, on old specimen of *Dictyotaceae*.

From the basal globular cell, the wall of which is about 1–1·5 μ thick, several (usually 2–4) erect filaments issue (Fig. 2b). Near the base, the cells are about 6–7 μ broad and 10–13 μ long, tapering upwards to about 3–4 μ. The filaments are very much branched from the base and upwards. The ramification is in most cases opposite and a pair of branchlets are given out from almost every cell in the main filaments, but occasionally a single branch only is developed, and in the upper part of the filaments the ramification has

Fig 2. *Acrochaetium Dwarkense* Boergs. a, a young plant; b, plant with monosporangia; c, part of a plant. (a, b, ×300; c, ×165.)

a tendency to become unilateral (Fig. 2c). The uppermost slender parts of the filaments are unbranched.

The chromatophore is a thick, parietal, irregularly lobed plate with a slightly protruding pyrenoid.

The sporangia are oblong-globular, about 6–7 μ long and 5 μ broad. They are either sessile or pedicellate, the latter being the more frequent. The pedicels are nearly the same length as the sporangia.

Acrochaetium sargassicola *Boergs.*, sp. nov.; *A. affini* Howe et Hoyt proximum, quod tamen disco basali magis evoluto, antheridiis alio modo formatis praecipue differt.

Thallus usque ad 2 mm. altus. *Cellula basalis* major, oblongo-subcylindrica, parte basali in textura hospitis immersa; e parte superiore, haud immersa, fila erecta nascuntur. *Fila erecta* a basi ramosa, apicem versus sensim paullum attenuata, in parte basali 8–13 μ lata, superne 5 μ lata. *Cellulae* cylindricae, inferiores 18–25 μ longae, superiores ad 50 μ longae, chromatophorum parietale pyrenoide laterali instructum complectentes. *Ramificatio* uberrima, ramis sparsis, in superiore parte plus minus secundatis. *Sporangia* sessilia aut pedicellata, subcylindrico-ellipsoidea, 16–19 μ longa, 11 μ lata. *Antheridia* et *carpogonia* in ramulis brevibus plerumque secundatim ortis nascuntur.

India: Bombay, growing socially upon *Sargassum* sp., *Boergesen* 5005 (type).

The plant (Fig. 3) reaches a height of more than two mm. The basal cell (Fig. 4a) is oblong-subcylindrical, often a little narrowed in the middle. The lowermost part is embedded in the tissue of the host. It has a length of about 26–28 μ and a breadth of 12–15 μ and has thick walls. In rare cases an accessory cell is developed close to the original basal cell (Fig. 5a). The erect filaments are from 8–13 μ broad with cells 18–25 μ long. Higher up, the filaments taper gradually and the cells are longer, about 8 μ broad and 50 μ long. The tips of the filaments are about 5 μ and the apical cells are rounded.

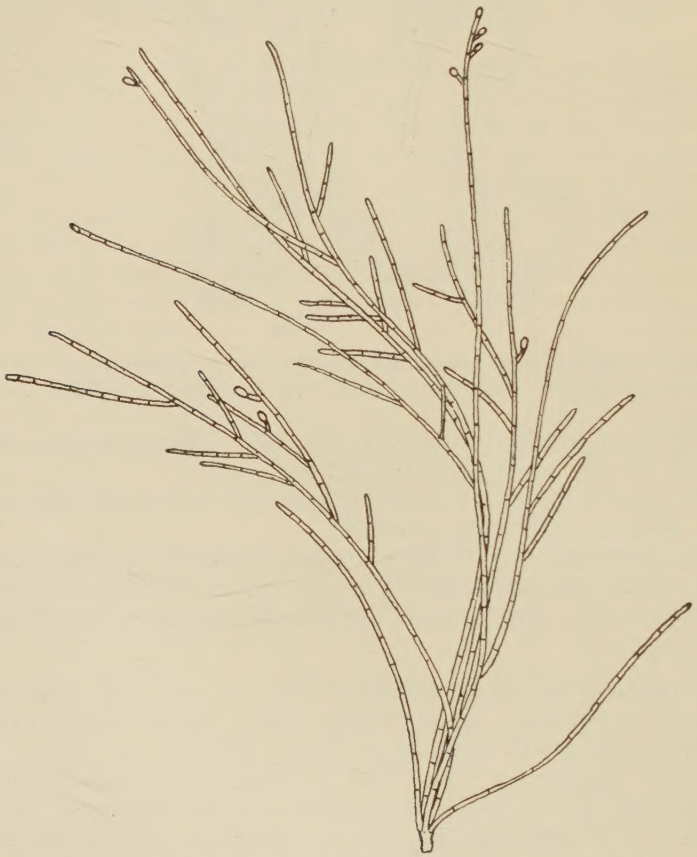

Fig. 3. *Acrochaetium sargassicolum* Boergs. Habit of plant (× 120).

The plant is much branched above, and the branches are given off irregularly on all sides, though with a tendency to be unilateral. As far as can be seen from dried material (my material in spirit had dried), the chromatophore is parietal with a large protruding pyrenoid. The sporangia are ellipsoidal in shape ; though generally sessile or pedicellate, some are terminal at the ends of the filaments. The sporangia are about 11 μ thick and 16–19 μ long. The antheridia (Fig. 4d) are developed on short unilateral or rarely opposite

Fig. 4. *Acrochaetium sargassicolum* Boergs. a, base of plant; b, c, branches with monosporangia; d, branch with antheridia. (a, b, c, ×300; d, ×250).

branchlets. The main filaments of the branchlets are about 50 μ long and composed of 5–6 short cells. The ramuli with antheridia are produced on the upper side of these cells (Fig. 5c). Very few carpogonia were seen and these were in most cases in rather poor condition. They occur in the branchlets close to the antheridia and have the usual lageniform shape (Fig. 5c). Monosporangia occur on the same plant and even on the same branch as the sexual organs (see Fig. 5b, showing branchlets with sporangia and antheridia alternating).

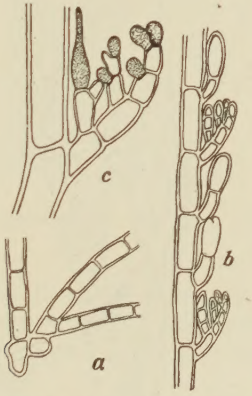

Fig. 5. *Acrochaetium sargassicolum* Boergs. a, base of plant showing beginning of a disc (×250). b, branch with monosporangia and antheridia alternating (×350); c, branchlet with a carpogonium and antheridia (×600).

Acrochaetium sargassicola comes near to the three related species, *A. affine* Howe et Hoyt, *A. robustum* Boergs. and *A. Hoytii* Collins. A thorough comparison of their relationship has been made by Howe and Hoyt (see Memoirs New York Bot. Gardens, 1916, 118). Besides

differences in size, etc., *A. robustum* has a small disc, which is also more or less developed in *A. affine*, but is not present in *A. Hoytii*.

Acrochaetium subseriatum *Boergs.*, sp. nov.; *A. seriato* Boergs. proximum, quod tamen thallo robustiore et cellulis brevioribus a specie nostra distinguitur.

Thallus caespitosus, usque ad 1 mm. altus, e filamentis brevibus irregulariter ramosis in thallo hospitis repentibus surgens et e filamentis erectis ramosis compositus. *Fila erecta* in basi plus minus quoquoversum, in superiore parte unilateraliter ramosa, e cellulis cylindricis inferne 27 μ longis, 5–8 μ latis, medio 35 μ longis, 4–6 μ latis, composita; chromatophorum parietale, pyrenoide laterali instructum. *Sporangia* oblongo-ovata, 11–12 μ longa et 6–7 μ lata, sessilia aut raro pedicellata, ad basin ramorum seriatim orta.

India: Tuticorin, in *Chondria* sp. epiphytica, *Boergesen* 5710 (type).

This plant (Fig. 6) is found upon *Chondria armata* Okam. var. *plumaris* (described in this paper). It forms dense, very branched tufts, about 1 mm. high. The base consists of short, irregularly ramified, creeping filaments composed of short cells (Fig. 6b). These filaments are probably partly immersed in the cuticle of the host

Fig. 6. *Acrochaetium subseriatum* Boergs. a, upper part of the thallus with sporangia (×150). b, basal part of a plant (×350).

(without being endophytic), but on account of the scarcity of material this could not be proved. From the basal filaments several erect filaments arise. These consist, in the lower part, of cells about 4–5 times as long as broad, and, in the middle, of cells about 6–8 times as long as broad, which taper a little towards the apex. The upper ends are obtuse and hairs are not present. The filaments are less branched in the lower part than higher up ; the branches are given out on all sides, but in the upper parts they have a tendency to be unilateral (Fig. 6a). The cells contain a parietal lobed chromatophore with a large, much protruding pyrenoid in the middle (Fig. 7). The sporangia are seriately placed along the upper side of the branches (Fig. 6a). They are as a rule sessile, but now and then a sporangium is pedicellate, and two-celled branchlets with a sporangium from each cell are also rarely present. The sporangia are oblong-obovate, about 11–12 μ long and 7–8 μ broad.

Fig. 7. *Acrochaetium subseriatum* Boergs. Part of the thallus with sporangia (×600).

The plant is certainly nearly related to the West Indian *A. seriatum*, but it is easily recognised by its slender form and especially by its relatively much longer cells and less marked pectinate appearance.

Grateloupia indica *Boergs.*, sp. nov. ; *G. undulatae* J. Ag. proxima videtur, quae tamen praeter alia thallo solidiore, colore obscuriore, perforationibus nullis a specie nostra distinguitur.

Thallus plus minus caespitosus disco parvo adfigitur, unde frons tenax, muscosa, mox dilatata, oblongo-linearis et irregulariter divisa exsurgit. *Thallus* usque 1 m. altus, colore rubro-purpureus, in thalli adultiore feminei forminibus numerosissimis minimis

distinctus, margine irregulariter sinuoso et undulato, hic illic prolificationibus instructus. *Tetrasporangia* cruciatim divisa per totam superficiem thalli dispersa. *Cystocarpia* sparsim in thallo immersa.

India : Okha Port, cast ashore, *Boergesen* 5490 (type).

From a small basal disc a short compressed cuneate stipe is given off which soon broadens into the flat oblong-linear thallus which then extensively divides (Plate II). It is of a very tough consistency and in the living condition is very mucilaginous and slippery. The colour of the dried specimens is dark purple-red with a violet tinge in the older parts of the thallus, becoming paler upwards. The thallus can reach considerable dimensions. I have seen specimens more than 1 metre long, though the largest specimen brought home was only 50 cm. The thallus soon divides into a number of lobes of various sizes and shapes. The margin is irregularly sinuate and waved. In the older parts of the female thallus a great number of small holes are gradually formed, up to 1–2 mm. broad, which probably originate from emptied cystocarps. In the dried female specimens, where the thallus is very perforated, numerous small spathulate proliferations are given off from the margin.

A transverse section shows that the thallus consists of a peripheral layer composed of densely packed short cells which are the terminal cells of short branch-systems. From the innermost larger cells, irregularly- (often stellately-) divided, filaments are given off, running through the mucilaginous interior. The cruciately-divided tetrasporangia scattered in the thallus are formed in the cortical layer.

The cystocarps are dispersed throughout the thallus. After the fertilization of the auxiliary cells these divide into two and from the uppermost cell the gonimoblast filaments are formed from which the carpospores originate. The gonimoblast is surrounded by convex filaments forming an urceolate cavity with an ostiole above. The building up of the cystocarp appears to agree well with Kylin's description of *G. filicina*, except that the latter has several gonimolobes (see Lunds Universitets Årsskrift, N.F., Avd. 2, Bd. xxvi. 19-21, 1930).

This species is related to the West Indian *G. undulata*. The latter has a somewhat smaller, thicker and firmer thallus, which is of a darker and, when dried, more brownish violet, colour. Further, the thallus is less waved along the margin, marginal proliferations are more commonly given off, and the perforations which occur in this new species have not been observed.

Halymenia porphyroides * *Boergs.*, nom. nov. — Syn. ? *Callymenia Harveyana* J. Ag. in Syst. Alg. hod. advers. 1844, 40 ; Spec. Alg. ii. 288 ; non *Halymenia Harveyana* J. Ag., Anal. algolog., 1892, 55.

*The name is in allusion to *Porphyra miniata*, which species it strongly recalls, the colour only being a little darker.

PLATE II

Grateloupia indica Boergs, sp. nov.

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PLATE III

Halymenia porphyroides Boergs, sp. nov.

Frons plana, tenuis, gelatinoso-membranacea, e stipite brevi cuneato mox valde expansa, in statu juvenili orbicularis, indivisa, basi cordata, mox valde dilatata, usque ad 41 cm. lata et 48 cm. longa, plus minus lobata, undulata, margine vage sinuoso continuo, colore roseo-rubro. *Tetrasporangia* cruciatim divisa, in cellulis corticalibus formata. *Cystocarpia* sparsa, thallo immersa.

The specimens were found in the sublittoral region in an exposed locality with tetrasporangia and cystocarps in January.

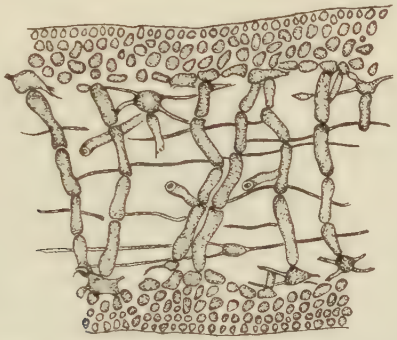

Fig. 8. *Halymenia porphyroides* Boergs. Transverse section of the thallus (× 150).

India : Dwarka ; Okha Port (cast ashore). Karachi, *J. A. Murray* (Herb. Kew.).

Distr. Cape.

The relationship of this plant with earlier described species has given me much trouble, especially as in most cases I had not access to original specimens. I am strongly inclined to believe that my plant is the same as *Callymenia Harveyana* J. Ag. from the Cape and wrongly placed in that genus. The Indian plant is a member of the *Grateloupiaceae* and referable to the genus *Halymenia*. but since the name *H. Harveyana* is already occupied, Agardh's specific epithet cannot be maintained.

The plant is fastened to rocks and stones by means of a small disc from which a very short stipe changes into the leaf-like lamina (Plate III). In a young, complete specimen the stipe is about ½ cm. long and the base of the thallus broadly cordate. The thallus is tough and elastic with roundish, sinuate and waved edges and becomes gradually more or less lobed. The colour is fine rosy-red. The thallus may reach large dimensions : for instance, a specimen preserved in the Kew Herbarium is 48 cm. long and 41 cm. broad.

A transverse section (Fig. 8) shows that the peripheral layer on both sides of the thallus is composed of short cell-rows several times divided, the innermost cells in these being the larger. In the mucilaginous interior of the thallus numerous transversely placed vigorous filaments are found, connecting the cortical layers on both sides. And crossing in all directions between these filaments are

thinner ones, taking their origin from stellately divided cells, found in great numbers below the cortical layers.

The tetrasporangia, which occur scattered in the cortical layer, are cruciately divided, and measure about 16 μ by 24 μ broad.

The cystocarps (Fig. 9) are likewise found scattered in the interior of the thallus. From the auxiliary cell a single cluster of carpospores is formed. The surrounding filaments unite in forming a rather loose-walled, urceolate cavity and the ripe carpospores escape through a small ostiole in the cortical layer.

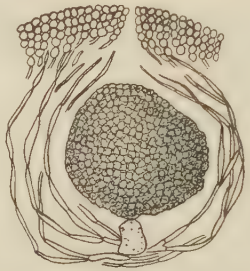

Fig. 9. *Halymenia porphyroides* Boergs. Section through thallus showing cystocarp (× 150).

Halymenia polydactyla *Boergs.*, sp. nov.; *H. Agardhii* De Toni proxima, sed nostra species thallo robustiore tenaciore colore obscuriore, stricturarum absentia distincta est.

Thallus 27 cm. altus et ultra (?), disco basali substrato adfixus, supra stipitem cuneatim expansus, mox repetite dichotome divisus, segmentibus teretibus tubulosis circiter 5–7 mm. latis fastigiatis apicibus obtusis. *Tetrasporangia* in strato corticali immersa, sparsa, cruciatim divisa, subgloboso-oblonga, 19–24 μ lata et 20–27 μ longa. *Cystocarpia* ignota.

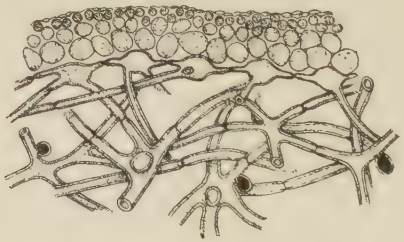

Fig. 10. *Halymenia polydactyla* Boergs. Part of transverse section of the thallus (× 150).

India: Okha Port, *Boergesen* 5521 (type); Dwarka; Karachi, Sept. 1881, *J. A. Murray*; Manora, *Miss L. Here* (Herb. Kew.).

Distr. India, Jedan Isles.

The largest specimen gathered of this handsome plant reaches a height of 27 cm. (Plate IV). The base, present in this specimen only, consists of a small roundish disc about 4 mm. broad, from which

PLATE IV

Halymenia polydactyla Boergs, sp. nov.

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the short, vigorous, compressed, cuneate stem arises. The stem is 2 cm. high, when the first division takes place. The thallus is repeatedly forked, fastigiate but with some tendency to become flabellate. The segments are terete or a little compressed below, tubulose, about 5–7 mm. thick in material preserved in spirit and made turgescent in water, up to 9 mm. in dried specimens. Just below the forks the thallus reaches a breadth of up to 15 mm. In the basal part the distance between the forks is often less than 2 cm., higher up in the thallus about 5 cm. The upper ends of the segments are blunt. The colour is dark purple red in the lower parts, becoming lighter red upwards. The consistency is very tough.

A transverse section (Fig. 10) shows that the wall is composed of small thick-walled cells. Seen from above these cells are roundish-polygonal with a diameter of about 5–9 μ. The cells underneath are larger and pass over into stellate cells. Near the periphery these cells are rather short-rayed; towards the interior the rays are lengthened more and more, forming a very loose tissue in the mucilaginous interior of the tubes. The breadth of these filaments varies from 4 to 20 μ, and the length of the cells of which the filaments are composed is about 130 μ. Here and there gland-cells issuing from the stellate cells are present.

Only tetrasporic plants were found. The tetraspores occur in the epidermal tissue and are of rather variable size and shape, roundish to oblong.

The Indian plant is certainly nearly related to *Halymenia Agardhii* De Toni. I have had two specimens of this to compare with mine, one from Florida (comm. Dr. M. A. Howe) and Crouan's specimens named *Chrysymenia dichotomo-flabellata* in Mazé et Schramm's *Algues de la Guadeloupe*. The Indian plant differs from these in its much more robust and generally larger and tougher thallus. Its colour furthermore is a much darker red than the fleshy-rose colour of the two specimens referred to. Moreover no constrictions are present in the Indian plant, and it seems also to be more regularly divided. When the difference in geographical distribution is added to these considerations it seems most natural to regard the plant from the East as a separate one from that of the Atlantic.

Mme. Weber van Bosse to whom I sent a photograph of the specimen figured on Pl. III kindly informed me that the Indian plant is very similar to her *Halymenia Aghardhii* (List of Siboga-Algae, p. 237) if not identical with it.

In his Icones of Japanese Algae Okamura has just described (vol. vi. p. 21, pl. 266) a *Halymenia* which he refers, though with great reservation, to *H. Agardhii* De Toni. On sending a photo of my plant to Prof. Okamura, he kindly replied: "The only difference which comes to my notice is the roundness of the axils in yours, while in ours it is acute and very narrow." Professor Okamura was

also kind enough to send me half of one of his few specimens. After comparing the Japanese plant with the Indian one I am inclined to consider the two plants distinct. Besides the character pointed out by Okamura, his specimen differs also in its smaller thallus, lighter colour and its seemingly softer consistency, reminding one of *Halymenia Agardhii*.

Halymenia venusta *Boergs.*, sp. nov. ; *H. Harveyanae* J. Ag. proxima ; differt thallo firmiore et crassiore, colore rubro obscuriore, prolificationibus magis copiosis plerumque ex utraque thalli superficie nascentibus.

Fig. 11. *Halymenia venusta* Boergs. Section through thallus showing cystocarp (× 165).

Thallus 30 cm. altus et ultra, plano-compressus, tenax et lubricus, colore ruber, stipitatus, disco parvo basali adfixus, basi in stipitem perbrevem cuneatim decurrens. *Lamina* plus minus divisa, laciniis aut latioribus aut angustioribus, prolificationibus numerosis irregulariter divisis pinnatis, pinnulis acutis e margine thalli saepe etiam ex utraque superficie thalli ortis. *Cystocarpia* et *tetrasporangia* in thallo dispersa.

India : Dwarka, exposed coast in low-lying rock pools near low water mark, *Boergesen* 5442 (type).

The thallus is fastened to the substratum by means of a small disc. From this the short, cuneate stipe, about ½ cm. long, changes abruptly into the rapidly broadened flat thallus. This is of very variable shape, sometimes hardly divided, forming large, flat fronds up to 20 cm. broad, occasionally divided into several lobes. The entire margin is densely proliferous, and in most of the specimens the surface also is proliferous (Plate IV.) The proliferations vary much in size, being usually quite small or having a length of several centimetres, and are usually repeatedly divided. Their main stems are rarely more than ½ cm. broad, generally less, and the apices of the pinnules are sharply acute. Their growth is of the fountain type (*Springbrunnentypus*). The divisions of the thallus are broadly rounded below, and likewise the proliferations and pinnules. The

PLATE V

Halymenia venusta Boergs, sp. nov.

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thallus is very tough, about 500 μ thick, and slimy, adhering strongly to paper. At the periphery it is composed of a cortical layer formed by short, forked cell-rows. The peripheral cells are oblong, densely packed and about 5–7 μ broad and 10 μ long. The whole cortical layer is about 50–60 μ thick. From the innermost largest cells, irregularly twisted and often stellately ramified filaments grow out, crossing each other in the mucilaginous interior.

The cystocarps (Fig. 11) are scattered throughout the thallus and are formed in the interior of the tissue. The carpospores form a dense, roundish body. This is surrounded by curved filaments and is surmounted by an ostiole about 50–80 μ in diameter in the cortical layer, through which the carpospores escape. The tetraspores are formed in the cortical layer and likewise occur scattered throughout the whole thallus. They are small, about 12 μ broad and 20 μ long and cruciately divided.

The present species belongs to the subgenus *Acanthymenia* J. Ag. It is, as noted above, related to *H. Harveyana* J. Ag. (*H. Floresia* Harv., Phycol. Austral. pl. 214) of which I have seen several specimens in Herb. J. Agardh at Lund. The Indian plant differs in its much more numerous marginal and also surface proliferations. The colour and consistency of the thallus is also somewhat different, and likewise the method of branching, this being more or less markedly pinnate in *H. Harveyana*. On account of the very finely divided branching there is a close transition between branches and proliferations (see Okamura, Icones of Jap. Algae, vol. iv. p. 43, pl. 162).

Our plant also shows some likeness to broad forms of *H. Floresia* Ag., but this species differs in its lighter colour, thinner thallus, fewer proliferations and difference in size of the peripheral cells (cf. Weber van Bosse, Algues du Siboga, pp. 228 and 232).

Fruiting specimens were gathered in January.

Cryptonemia undulata *Sonder* in Linnaea, vol. xxvi. 516; Harvey, Phyc. Austral. tab. 205; Kützing, Tab. Phycol. 19, tab. 31.

India: Dredged off Dwarka at about 5 fathoms; Okha Port; Karachi, *J. A. Murray* (in Herb. Kew.); *K. G. Naik* (a single specimen in spirit).

Distr. Australia.

This plant may now be recorded from the Indian Ocean. In the Kew Herbarium are to be found some large specimens from Karachi labelled *Delesseria subdichotoma*, but it is evident that they do not belong to that family but to the Cryptonemiales. They agree in fact with *Cryptonemia undulata*, specimens of which I have seen from Encounter Bay and Champion Bay in J. Agardh's Herbarium at Lund. My specimens are irregularly divided, the lobes having a breadth of $\frac{1}{2}$–3 cm. with vigorous nerves which run up through the thallus and become divided several times until they disappear. Along the edges of the older part of the thallus more or less numerous proliferations are present, and these are also occasionally developed

from the surface. They are usually small, with a short stalk and a small roundish leaf-like upper part 1–2 mm. broad.

Some smaller specimens collected at Dwarka and Okha Port agree well with Kützing's figure. The lobes reach a breadth of only 1–2 cm., their edges are very waved and they have few proliferations.

A transverse section of the thallus, which is about 70 μ thick, shows that it consists at the periphery of a layer of densely placed short assimilating cells and one or two layers of larger roundish ones below. The medullary tissue is composed of thick-walled filaments tightly woven together. The midrib develops through the division of the cells of the cortical layer, which form short, dense, vertical rows of cells.

In one of my specimens a few cystocarps were found. They occurred in the small leaf-like part of the proliferations, immersed in the medullary tissue (see Kylin in Lunds Univers. Årsskrift, Avd. 2, Bd. xxi., 1925, p. 20, fig. 8). The cluster of carpospores forms roundish clumps and the ripe carpospores escape through a small ostiole.

Sarconema furcellatum *Zanard.*, Plant. Mar. Rubr. Enum. no. 79, tab. viii, fig. 1.—*Plocaria furcellata* Mont., Pugill. Pl. Yemens. no. 12; Sylloge Gen. Crypt., p. 413. *Trematocarpus furcellatus* Kütz., Tab. Phycol., vol. xix. tab. 73 c, d. *Gracilaria furcellata* Zanard., Plant. Mar. Rubr. Enum. p. 58, no. 84. *Dicranema Montagnei* Grün., Alg. Fidschi, Tonga- und Samoa-Inseln, p. 43.

India: Bombay: Backbay, Malabar Hill; Dwarka; Karachi, *J. A. Murray* (Herb. Kew.).

Distr. Red Sea.

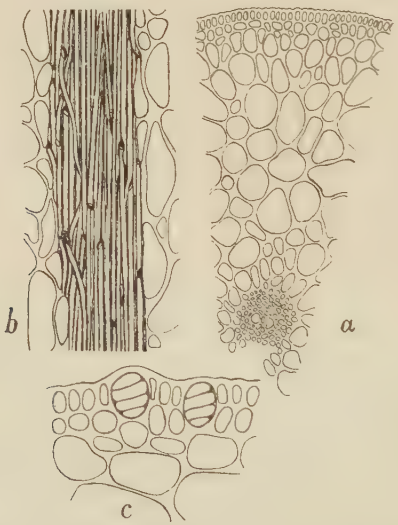

Fig. 12. *Sarconema furcellatum* Zanard. a, transverse section of the thallus (about ×60). b, longitudinal section of the central strand (about ×175). c, part of the peripheric tissue with tetrasporangia (about ×200).

In referring the Indian material to this species, which hitherto has been known only from the Red Sea, I should point out that I have not been able to compare my specimens with the original material, but Kützing's figures and description appear to make it evident that the Indian and the Red Sea plants are identical. For synonymy see the remarks by Bornet in Mazza, Saggio di Algologia Oceanica (La Nuova Notarisia, 1907, pp. 31–35).

The repeatedly forked thallus forms dense, broad, intricate tufts up to 15 cm. high, which bear a strong resemblance to the tufts of *Furcellaria fastigiata*. The breadth of the thallus varies considerably: in specimens from exposed shores its diameter is about $1\frac{1}{2}$ mm.; in specimens from sheltered localities it is scarcely $\frac{1}{2}$ mm. The apical growth is of the fountain type. A transverse section (Fig. 12a) shows at the periphery a layer of densely placed rectangular cells about 12 μ long and 6 μ broad. Below this is a parenchymatous tissue composed of roundish-polygonal cells becoming larger inwards. In the middle of the thallus there is a central strand, about 150 μ broad, composed of densely packed thick-walled cells about 5-7 μ in diameter: a longitudinal section (Fig. 12b) shows that these are filaments of long cells with more or less oblique transverse walls.

The tetrasporangia (Fig. 12c) are formed in the peripheral layer; they are broadly oval, about 35 μ long and 25 μ broad and zonately divided. Tetrasporic specimens were gathered in January.

Judging from dried material, the plant seems to have decumbent creeping rhizome-like filaments such as occur in *Furcellaria fastigiata*.

The plant was found near low water mark in exposed places, attached to stones and shells.

Aghardhiella robusta (*Grev.*) *Boergs.*, comb. nov.—*Dumontia robusta* Grev., Alg. Brit. p. 62. *Solieria australis* Harv., Phyc. Austral. tab. 149; Kützing, Tab. Phyc. vol. xix. tab. 27. *Rhabdonia robusta* J. Ag., Spec. Alg. ii. p. 355.

India: Dwarka, dredged at about 5 fathoms. Okha Port, cast ashore. Karachi, 1859, *W. J. S. Pullen* (Herb. Kew.); *A. B. Kotwall*.

Distr. Australia, Japan (?), Malayan Archipelago.

During a visit to Lund, Prof. Kylin kindly informed me that the type species of the genus *Rhabdonia*, namely *R. coccinea* Harv., has an apical cell, whereas several others of the genus have the fountain (*Springbrunnen*) type of growth characteristic of the genus *Agardhiella*. These latter species should be transferred to this genus, and in accordance with this view the present species becomes *Agardhiella robusta*, comb. nov., as above.

Of the figures quoted, that of Kützing agrees best with the Indian plant; the Japanese plant pictured by Okamura (Icones Jap. Alg., vol. iv. p. 102, pl. 174) has a very different aspect from ours (see also Yendo, Bot. Mag. Tok., xxviii., 1914, p. 273). The plant is irregularly branched on all sides. At the base the branches are as a rule much constricted but become rapidly thicker and remain almost

cylindrical until they taper slowly into the upper acute apex. The larger specimens reach a height of 37 cm. and the filaments in these specimens have a breadth of 3 mm, but several of the specimens are more slender with the thicker filaments only 2 mm. and others scarcely 1 mm. broad.

These thin specimens show much resemblance to the var. *tenuiramea* A. and E. S. Gepp (Journ. Bot. 1906, p. 255), which I was able to examine during a visit to the British Museum, London, where Mr. A. Gepp most kindly showed me his specimens.

A transverse section shows that the cortical layer consists of short branchlets composed of oblong roundish cells which are small outside but larger within. Long unicellular hairs are common in the young thallus. From the wall of the innermost larger cells, stellately divided filaments grow out, crossing the innermost mucilaginous interior in all directions. Only tetrasporic specimens were found. The zonately divided tetrasporangia are formed in the cortical layer and originate, as pointed out by Kylin (in Lunds Universitets Årsskrift, N.F., Avd. 2, vol. xxiv, 1928, p. 71), from terminal cells of the branchlets.

Calliblepharis fimbriata *Kütz.*, Phyc. gen. 404; Spec. Alg., 755; Tab. Phyc., vol. xviii, tab. 11a; J. Agardh, Spec. Alg., ii. 621.—*Sphaerococcus fimbriatus* Ag., Spec., 299; Suhr, Uebers. Alg. Ecklon, 10, no. 35, tab. 2, fig. 12.

India: Karachi, *J. A. Murray*; Manora, near Karachi, *Miss L. Here.*

Distr. Cape.

Of this plant, known only from the Cape, several fine specimens are present in the Kew Herbarium. I have compared the Indian specimens with plants from Mossel Bay in J. Agardh's Herbarium at Lund, and found that they agree well. The largest specimen measured 26 cm. high.

It grows by means of an apical cell such as Kylin pointed out for *C. jubata* (Kylin, Entwickelungsgesch. Florideenstudien, p. 72). The thallus is divided into several lobes about $\frac{3}{4}$ cm. broad, and these possess along the margin dense proliferations about $\frac{1}{2}$–1 cm. long. The latter have a short stipe and an irregularly divided upper part. Very rarely surface proliferations also occur.

Hypoglossum spathulatum *Kütz.*, Spec. Alg., p. 877; J. Agardh, Spec. Alg., iii. 3, 186; Kylin, Lunds Universitets Årbog, N.F., Avd. 2, Bd. xx. 9.—*Delesseria spathulata* Kütz., Tab. Phyc., vol. xix, tab. 12. *D. hypoglossoïdes* Harv., Phyc. Austral., tab. 87; Kütz., Tab. Phyc., vol. xix., tab. 13.

India: Okha Port, cast ashore.

Distr. Australia, Malay Archipelago.

I collected several specimens of this plant, which appear to agree with the Australian species, as represented by Harvey's Alg. Austral. Exsicc. no. 282, of which we have a fine specimen in the Botanical

Museum at Copenhagen, and by several specimens in Herb. J. Agardh at Lund.

Fig. 13. *Hypoglossum spathulatum* Kütz. a, part of thallus of tetrasporic plant (×6). b, part of the same of antheridial plant (×6). c, part of thallus with a cystocarp (×6).

The plant forms densely branched bushes up to 10–12 cm. high of a fine rosy-red colour. The almost linear fronds of which the thallus consists are up to about 4 mm. broad in their broadest part and vary little in width except at the acute summit. They consist of a single layer of cells, except for the midrib, which is three cells thick and to which later on cortical cells are added (Fig. 14). Proliferations are given out in great numbers from the midrib.

In the tetrasporic plant (Fig. 13a) the sori are found in long narrow belts on both sides of the midrib. These sori are about 3 mm. long and ·2 mm. broad, and are, when fully developed, rectangular in shape. Between each pair of sori there is a sterile area 1 cm. or more long.

The antheridial bodies (Fig. 13b) are found on both sides of the midrib in small, irregularly shaped, scattered groups. The cystocarps, which are developed from the midrib, are urceolate, with a short neck above about 115 μ broad (Fig. 13c). The fully developed cystocarp has a breadth of about 500 μ. All the fruiting specimens

were gathered in the middle of January. Mme. Weber v. Bosse (Vidensk. Medd. naturh. Forening, Bd. lxxxi., 1926, 113) mentions that she found tetrasporic plants at Kei Islands, otherwise fruiting specimens do not seem to have been recorded.

Fig. 14. *Hypoglossum spathulatum* Kütz. Transverse section of thallus (×50).

Herposiphonia tenella *Nägl.*, in Schleiden und Nägeli, Zeitschr. für wissenschaftl. Botanik, Heft iii-iv. 238, tab. viii (1846) ; Falkenberg, Rhodomelaceen, 304.—*Hutchinsia tenella* Ag., Spec. Alg., ii. 105.

India : Dwarka (sterile).

Distr. In most warmer seas.

A few small pieces were found intermingled in the thallus of *Boodlea siamensis* Reinb. The distribution of the branches and branchlets on the creeping rhizome is normal (as described by Falkenberg, *l.c.*, p. 303). The diameter of the rhizome is about 80–110 μ, and the segments are about as long as broad. The number of pericentral cells is 9–10 in the main branches and 7–8 in the branchlets. The branchlets are short, composed of about 12 segments ; they are much curved with their upper ends turned towards the growing point. The apices are broadly rounded, and the trichoblasts are poorly developed. The specimens have a similar appearance to the plant figured in Mar. Alg. D.W.I., vol. ii. 289, fig. 289.

Chondria cornuta *Boergs.*, sp. nov. ; a *C. tenuissima* Ag. et speciebus aliis affinibus, parte apicale ramulorum cystocarpiiferorum in prolongationem cornutam producta ad basin cystocarpiorum praesentem inter alia discedit.

Thallus caespitosus, circiter 15 cm. altus, e filamentis erectis teretiusculis circiter $\frac{1}{2}$–$\frac{3}{4}$ mm. latis undique ramosis, ramis acutis sparsis virgatis subrectis, compositus. *Tetrasporangia* in ramulis inflatis et in gyrum ductis immersa. *Cystocarpia* solitaria, in latere

superiore ramulorum sessilia, urceolata, ovato-subglobosa, circiter 700 μ longa, 200 μ lata.

India: Bombay (Malabar Hill), *Boergesen* 5076 (type); Santa Cruz, Karachi, *J. A. Murray* (Herb. Kew.).

The plant is common on the shores near Bombay, where it was found on rocks or in rock-pools in exposed places near or a little below low-water-mark. Fruiting specimens were gathered in January.

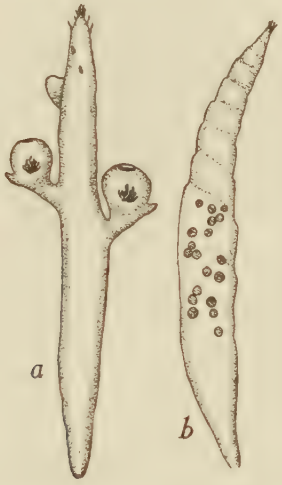

Fig. 15. *Chondria cornuta* Boergs. a, a branchlet with cystocarps (× 17½). b, a tetrasporic branchlet (× 17½).

The plant grows in dense tufts up to a height of about 15 cm. The erect main shoots are but slightly branched below, though branches are developed above. The lower ones are long, the upper shorter and directed towards the main stems. The insertion is narrow but they gradually attain normal size and then taper gradually towards the acute apex. From the larger branches short ramuli are given off in the same way. The main filaments are about ½–¾ mm. thick. A transverse section shows 5 pericentral cells surrounded by a cortical tissue, the cells of which become gradually smaller outwards. The colour of the plant is dark red-brown when dried.

The tetrasporangia (Fig. 15b) are formed in the upper ends of the branches and in the ramuli. The uppermost fertile ramuli are short and thick, about 100 μ broad and 3–5 times as long; the lowermost are longer. They enlarge in a screw-like manner.

The cystocarps (Figs. 15a, 16) are formed on the upper side of short ramuli. As the cystocarps increase in size, they appear to be placed terminally on a short stalk, which is the lower end of the ramulus. The upper end of the ramulus is directed downwards and appears below the cystocarp as a short spine. The ripe cystocarp is about 450 μ long and almost as broad.

The cystocarps are thus situated very similarly to those of *C. tenuissima* Ag. (see Thuret et Bornet, Études Phycologiques, 1878, plates 43-48), but in this the apex of the ramulus in the ripe cystocarp is very little developed, being seen only as a short scar-like outgrowth from the ripe cystocarp.

Fig. 16. *Chondria cornuta* Boergs. A cystocarp (×50).

C. arborescens J. Ag. has a similar spine, but this species differs from our plant in size, ramification and general appearance.

In the Kew Herbarium are found two specimens referable to *C. cornuta*. They are female plants gathered at Karachi by J. A. Murray and labelled *Chondriopsis lanceolata* Harv. According to Harvey's figure (Phycol. Austral., tab. 239) this plant differs in ramification and in the absence of spines at the base of the cystocarps.

Chondria dasyphylla *Ag.* Sp. Alg. p. 350; Falkenb. Rhodomelaceen, 197, tab. 22.

A female plant was found as an epiphyte on *Udotea indica*.

India: Dwarka.

Distr. Seems to occur in most warmer seas.

Chondria armata *Okam.*, Icones Jap. Alg., vol. i., 69, pl. 16, figs. 9–19; Weber van Bosse, Liste des Algues du Siboga, 353.— *Lophura armata* Kütz., Tab. Phyc., vol. xvi., p. 2, tab. 3, figs. a-b. *Rhodomela crassicaulis* Harv., Alg. exsicc. Ceylon no. 8; Fergusson,

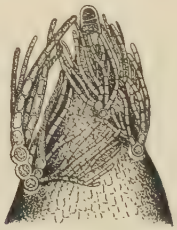

Fig. 17. *Chondria armata* Okam. var. *plumaris* Boergs. Apex of a ramulus with trichoblasts (×150).

Alg. exsicc. Ceylon no. 10 ; Svedelius in Botaniska Studier tillägnade F. R. Kjellman, 191, figs. 3–9. *Chondriopsis crassicaulis* J. Ag., Analecta Algologica, 1892, p. 161. *Chondria minima* Weber, Liste des Algues du Siboga, p. 309, pl. vii. fig. ix. ; non *Chondria crassicaulis* Harv., Alg. nov. Wright, in Proc. Amer. Acad., vol. iv., p. 329.

India : Tuticorin, Burma (Herb. Mus. Brit.).

Distr. New Caledonia, Japan, Malayan Archipelago, Ceylon, India.

Okamura was the first to point out that *Lophura armata* Kütz., and the plant from Ceylon which Harvey named *Rhodomela crassicaulis*, are the same species. As Harvey's plant is a *Chondria*, and as he had already given the specific name *crassicaulis* to another *Chondria*, the plant must, as stated by Okamura, bear the epithet which Kützing gave it. Later Dr. Anna Weber added to this species what has proved to be another synonym, namely her species *Chondria minima*.

When I began the examination of this plant I had only seen a few specimens of Harvey's *Rhodomela crassicaulis* preserved in J. Agardh's herbarium at Lund and a few species of *Chondria armata* from Japan given me by Professor Yamada. My Indian specimens agreed with Harvey's plant, and on comparing them with the Japanese plant I believed that we had most probably to do with two distinct species, one (Harvey's) being characterized by its featherlike thallus (which is also seen in the Indian material in the living state), and the other with ramuli arranged all round the main axis, as described and figured by Kützing and Okamura. Some anatomical differences also appeared to be present. In mine, large, vigorous, spirally arranged and freely protruding trichoblasts were present in great numbers, densely covering the protruding acute apex of the ramuli (Fig. 17). In the Japanese plant, on the other hand, the trichoblasts were much smaller, evidently densely pressed to the

Fig. 18. *Chondria armata* Okam. var. *plumaris* Boergs. Upper part of young thallus (×4½).

surface of the thallus, and the acute summit of the ramuli was not, or only a very little, covered by the trichoblasts. Specimens of Harvey's and Fergusson's plants, from Ceylon and Tuticorin respectively, which I saw at Kew and at the British Museum, were all featherlike and confirmed my opinion that the Japanese and the Ceylon plant were specifically distinct.

On my return from England Dr. Weber very kindly sent me all her material of *Chondria armata*. By means of this valuable collection I have convinced myself that the two forms really belong to the same species, since they are connected by intermediate forms. Thus specimens from Flores, Dutch East Indies, had the ramuli surrounding the summit of the main axis, and in some of the specimens from Ceylon the arrangement of the ramuli was not markedly featherlike. Furthermore, in some fine material in spirit of his Ceylon plant, which Prof. N. Svedelius most kindly sent me, the ramuli are not so regularly pectinate, but often grow out in all directions and the trichoblasts are absent or very poorly developed.

From the above we may conclude that the plant when typically developed has two very distinct forms ; a more eastern form, which I propose to call var. **typica,** known from Japan and New Caledonia, with ramuli on all sides ; and a more western form, known from India and Ceylon, which I propose to call var. **plumaris.**

In contrast to Svedelius' specimens which grew in very exposed places my specimens were found on sheltered coasts and possibly the featherlike form is an adaptation due to the sheltered locality.

Fig. 18 shows a young shoot, with ramuli, of the var. *plumaris*. The ramuli are, in the young upper part, arranged spirally, but during growth a dislocation takes place, the result being that they become arranged in two opposite rows along the main axis. The ramuli are fusiform, tapering somewhat below and markedly so towards the acutely pointed apex. The plant belongs to the Section *Euchondria*. A transverse section shows 1 central and 5 pericentral cells, surrounded by a thick layer of roundish cells which become gradually smaller externally. As pointed out by Svedelius, the plant has thick, creeping, perennial, rhizome-like stems fixed to the rocks by rhizoids ; from this basal part the annual erect filaments arise. My specimens were sterile.

XV.—TWO NEW FERNS FROM COLOMBIA.*

William R. Maxon.

In sorting out and identifying recently a large number of ferns of the F. C. Lehmann collection (chiefly from Colombia and Ecuador) acquired by the Royal Botanic Gardens, Kew, through the Bentham Trustees many years ago, the writer met with many numbers that apparently had not been studied by Hieronymus, presumably because of their having been collected in insufficient quantity for the

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numbered sets distributed by the collector to various herbaria. Some of these are rare species, which have been published by Hieronymus and others on the basis of other numbered specimens of the Lehmann collection. However, the two species here discussed appear not to have been previously described ; each is represented by a single specimen only.

For the privilege of studying the rich Lehmann collection the writer wishes to express his thanks to the Director, and at the same time to acknowledge gratefully many courtesies extended during two summers at Kew.

Dryopteris (*Meniscium*) **minuscula** *Maxon*, sp. nov. ; a *D. gigantea* (Mett.) C. Chr. specie americana altera subgeneris *Meniscii* frondibus simplicibus gaudente notis omnibus valde recedit.

Rhizoma (incompletum) repens, parvum (circa 5 mm. diam.), apice paleis reticulatis teneris brunneis glabris circa 4 mm. longis acuminatis late ovatis sparse vestitum. *Folia* 4, subfasciculata, 20–27 cm. longa, longe stipitata, omnino glabra, stipitibus teretibus lucidis brunnescentibus circa 0·5 mm. diam. gracillimis, aut laminam aequantibus aut plerumque multo longioribus ; laminae simplices, 10–12 cm. longae, 2·5–4 cm. latae, anguste elliptico-oblongae, apice acuto vel acutiusculo abrupte caudatae, basi late cuneatae sed non decurrentes, marginibus anguste scariosis subrepandis, costa utrinque valde prominente supra anguste sulcata, nervis 30–35-jugis utrinque prominentibus obliquis (angulo 45° egredientibus) marginem fere attingentibus ibidem arcuatis ; areolae supra perspicuae medio laminae utroque 10–12-seriatae, venis transversis supra prominentibus, sterilibus angulo acuto (45°) conjunctis (ramo excurrente subaequali apice hydathodo elongato incrassato), fertilibus angulo latiore conjunctis et saepe arcuatis, ramo excurrente plus minusve reducto ; *sori* rotundi vel oblongi, parvi (1–1·5 mm. diam.), sporangiis glabris, sporis ovoideis ochraceis rugoso-alatis circa 55 μ longis et 30 μ latis.

Colombia : Habitat in locis abruptis humidis ad fluvium Rio Dagua in regione maritima haud procul ab oppido Buenaventura, alt. 0–300 m., *Lehmann* 4433. Typus in herbario Kewense asservatur.

A unique species, differing widely in all diagnostic characters from *Dryopteris gigantea* (Mett.) C. Chr., the only simple-leaved American species of the subgenus *Meniscium* previously known. It is probable, however, that the plant attains a somewhat greater size than indicated by the single specimen at hand.

Dryopteris (*Lastrea*) **perstrigosa** *Maxon*, sp. nov. ; species ob paleas rachis et costarum persistentes majusculas insignis, *D. horrenti* Hieron. subgeneris *Lastreae* affinis, quae ut videtur differt : pinnis distantioribus basi 2·5 cm. latis majoribusque, costis subtus fuscescentibus lucidisque et paleis minoribus caducis fuscescentibus parce praeditis, notis pubescentiae, et soris supramedialibus marginum lobis aliquando obtectis.

Rhizoma et stipes desunt. *Lamina* (fere completa) 75 cm. longa, 16–20 cm. lata, ambitu anguste lineari-lanceolata, pinnato-pinnatifida, utroque gradatim attenuata, rachi valida, basi fere 5 mm. crassa, ubique densissime hirtello-strigosa (pilis fulvescentibus vel sordido-albidis rigidis obliquis circa 0·5 mm. longis), supra profunde sulcata, persistente paleacea, paleis laxe divergentibus fulvescentibus linearibus attenuatis parce pubescentibus ciliolatisque crebre striolatis firmis lucidis usque ad 1 cm. longis et 1 mm. latis ; *pinnae* crasso-herbaceae, opacae, utrinque sordido-virides, infra apicem brevem pinnatifidum circa 45 utroque latere, infra oppositae vel suboppositae, sursum alternae, plerumque subremotae, sessiles, profunde pinnatifidae, mediales 8–10 cm. longae, basin versus circa 1·5–1·8 cm. latae, lineari-attenuatae, apice serrato-caudatae, recte patentes, inframediales sensim breviores decurvatae, inferiores remotae interstitiis 2–2·5 cm. distantes, infimae nonnullae abbreviatae valde reflexae, costis pinnarum omnium ubique dense hirtello-strigosis et subtus inter basin et medium paleis attenuatis lucidis laxe imbricatis majusculis eis rachis similibus ornatis, costis basi subtus etiam aerophoro fusco duro elevato-rotundato magno instructis ; *segmenta* pinnarum majorum 30–35 utroque costae latere, recte patentia, ligulato-linearia, obtusa, plus minusve falcata, circa 8–10 mm. longa, 2·5 mm. lata, ala angustissima 0·5–0·8 mm. lata conjuncta, marginibus ciliolatis sinuatis vel subcrenatis, revolutis sed non soros amplectentibus, sinubus exacte linearibus interstinctis ; segmentorum costulae etiam nervi supra pilis setiformibus crassiusculis albidis obliquis strigosi, subtus costulae copiose et nervi parce albido-strigosi, parenchymate pilis fragilibus brevissimis perpaucis praedita ; *nervi* 12–16-jugi, obliqui, crebri, simplices, immersi, marginem attingentes ; *sori* exacte mediales, subrotundi, mediocres, conferti et aetate confluentes, exindusiati, receptaculis siccitate elevatis ; sporangia numerosissima, brunnea, glabra, sporis fabiformibus sublaevibus 45 μ × 30 μ diam.

Colombia : Habitat in declivibus montis Paramo de las Delicias in Andibus centralibus Popayanensibus, alt. ut videtur 3000–3300 m., *Lehmann* ; " B. T. 913." Typus in herbario Kewense asservatur.

Related, as appears from the description, to *D. horrens* Hieron., but exceedingly well marked by its more numerous and invariably simple veins, its strictly medial sori, its copious dense strigose pubescence throughout, and especially its numerous persistent scales upon the rachis and costae. Although the specimen is old, the last character is conspicuous, the slender glossy scales forming a loose, subimbricate covering upon all but the uppermost pinnae for about half their length.

XVI.—CONTRIBUTIONS TO THE FLORA OF SIAM.*
ADDITAMENTUM XXXIII.

Anotis trimera *Craib* [Rubiaceae-Hedyotideae]; a speciebus aliis floribus axillaribus distincte pedicellatis, pedunculo communi vix evoluto distincta.

Caules annui, circa 30 cm. alti, simplices vel pauci-ramosi, sicco brunnei, iuventute fusci, glabri. *Folia* opposita, oblongo-lanceolata vel lanceolata, apice subobtusa, basi cuneata, ad 5 cm. longa et 1·8 cm. lata, subchartacea, sicca supra viridia vel fusca, subtus pallidiora, glabra, costa pagina utraque plus minusve conspicua vel subtus prominula, nervis lateralibus utrinque circa 4 obliquis pagina utraque obscuris, nervulis omnino obscuris, petiolo ad 4 mm. longo suffulta; stipulae ad 5 mm. longae, lobulatae, piluloso-puberulae, persistentes. *Pedunculi* axillares, petiolo saltem dimidio breviores, flores circa 5 gerentes, parvi-bracteati; pedicelli 5–8 mm. longi, glabri. *Receptaculum* vix 1 mm. longum, glabrum. *Calycis* tubus brevis, pauperius ciliolatus, segmenta 3, late lanceolata, acuta, 2·5 mm. longa, basi fere 1 mm. lata, ciliolata, dorso carinata. *Corolla* dorso puberula; tubus 2 mm. longus, intra inferne parce pilosus; lobi 3, vix 1 mm. longi, basi paulo ultra 1 mm. lati. *Stamina* 3, filamentis circa 0·5 mm. longis ad corollae tubi apicem insertis, antheris 0·75 mm. longis. *Stylus* corollae subaequilongus. *Fructus* 3·5 mm. longus, apice e calyce exsertus, calycis segmentis persistentibus, apice loculicide dehiscens; semina loculo quoque 2–3, ambitu oblonga, facie altera concava, altera convexa.

Saraburi, Muak Lek, *Put* 1873.

Ophiorrhiza aggregata *Craib* [Rubiaceae-Hedyotideae]; ab affini *O. costata* Ridl. calycis segmentis pro rata longioribus, corollae lobis dorso angustius alatis, stigmatibus acutis recedens.

Caules annui, erecti, ad 17 cm. alti, inferne radicantes, basi circa 3 mm. diametro, fistulosi, glabri. *Folia* opposita, paribus inter se aequalibus, elliptico-oblonga vel oblongo-ovata, apice acuminata, basi cuneata vel late cuneata, ad 15 cm. longa et 6·5 cm. lata, chartacea, sicca supra fuscescentia, subtus pallide brunnescentia, primo ad marginem pauperius brevius setulosa, aliter glabra, costa supra conspicua subtus prominente, nervis lateralibus utrinque 11–13 supra conspicuis subtus prominulis intra marginem arcuatim iunctis, nervulis obscuris, petiolo usque ad 2·5 cm. longo suffulta; stipulae cito deciduae, 7 mm. longae. *Inflorescentia* terminalis, pedunculo communi brevi vel ad 2 cm. longo densius longius crispatim puberulo suffulta, densa, circa 2 cm. diametro, bracteis brevibus deciduis. *Receptaculum* 1·25 mm. longum, costatum, dense pallide ferrugineo-puberulum. *Calycis* segmenta 5, deltoidea vel oblongo-deltoidea, 0·75 mm. longa, dorso dense puberula. *Corolla* alba (ex *Kerr*), dorso sparse puberula, primo superne valde costata; tubus circa 7 mm. longus, intra medio albo-pilosus; lobi 5, circa

*Continued from *K.B.*, 1931, p. 448.

2·5 mm. longi. *Stamina* 5, filamentis 2·5 mm. longis glabris ad corollae tubi 3 mm. supra eius basem affixis, antheris linearibus vix 2·5 mm. longis. *Stylus* 3 mm. longus, stigmatibus subacutis vix 2 mm. longis.

Pang-nga, Kao Bangto, 900 m., by stream in evergreen forest, *Kerr* 17212.

Ophiorrhiza alata *Craib* [Rubiaceae-Hedyotideae]; ab affini *O. costata* Ridl. foliorum nervis lateralibus magis numerosis, calycis segmentis et corolla longioribus recedit.

Caules herbacei, ad 50 cm. alti (ex *Kerr*), glabri, sicco fusco-brunnei, iuventute nodos prope pallide parvi-maculati. *Folia* opposita, paribus inter se aequalibus vel parum inaequalibus, saepissime elliptica vel oblongo-elliptica, apice longius subacute acuminata, basi cuneata, late cuneata, vel subacuminata, 8–14·5 cm. longa, 3–5·8 cm. lata, chartacea, sicca supra saepissime fuscescentia, subtus pallide viridia vel brunnescentia, supra marginem versus setulis brevibus instructa, subtus ad costam nervosque laterales pilis brevibus sparse instructa, costa supra conspicua subtus prominente, nervis lateralibus utrinque 11–13 arcuatis intra marginem anastomosantibus supra conspicuis subtus prominulis, nervis transversis paucis subconspicuis, petiolo 1–3 cm. longo glabro suffulta; stipulae deciduae, circa 3 mm. longae. *Inflorescentia* terminalis, pedunculo communi ad 4 cm. longo incluso ad 9 cm. longa et 6 cm. diametro, pedunculo cum ramulis pilis brevibus crispatis ferrugineis tecto; bracteae angustae, deciduae; flores albi (ex *Kerr*), pedicellis brevibus vel ad 2·5 mm. longis pilis brevibus ferrugineis obtectis suffulti. *Receptaculum* ad 1·5 mm. longum, costatum, pilis brevibus ferrugineis plus minusve deciduis instructum. *Calycis* segmenta deltoideo-lanceolata, subacuta, circa 1·5 mm. longa. *Corolla* dorso papilloso-puberula; tubus circa 12·5 mm. longus, intra supra staminum insertionem ad antherarum apices hirsutus; lobi 5, late lanceolati, circa 3·5 mm. longi et 1·5 mm. lati. *Stamina* 5, filamentis vix 3 mm. longis glabris circa 5 mm. supra corollae tubi basem insertis, antheris 2·75 mm. longis. *Stylus* ad 1 cm. longus, stigmatibus duobus latis obtusis.

Chantabun, Kao Soi Dao, 1300–1600 m., evergreen forest, *Kerr* 9643.

Ophiorrhiza angkae *Craib* [Rubiaceae-Hedyotideae]; ab *O. condensa* Craib inflorescentia laxa distincte pedunculata inter alia recedit.

Caules e rhizomate repente annui, circa 30 cm. alti, fistulosi, brunnei vel subvirides, primo sparse crispatim ferrugineo-pubescentes. *Folia* opposita, paribus inter se aequalibus vel fere aequalibus, saepissime oblongo-lanceolata, haud rarius parum inaequilateralia, apice obtuse acuminata vel subacuminata, basi cuneata, acuminato-cuneata, vel rarius rotundata, ad 13 cm. longa et 4·5 cm. lata, membranaceo-chartacea, sicco subtus pallidiora,

supra setulis sparsis instructa, subtus ad nervos puberulo-setulosa, nervis lateralibus utrinque 10–14 supra conspicuis subtus prominulis intra marginem anastomosantibus, petiolo 0·5–2 cm. longo suffulta ; stipulae angustae, circa 2 mm. longae, deciduae. *Inflorescentia* terminalis, pedunculo communi saltem 2 cm. longo densius crispatim pallide ferrugineo-puberulo suffulta, sublaxe ramosa, 2–3·5 cm. longa, 3–4·5 cm. lata ; pedicelli breves ; bracteae saepe persistentes, angustae, circa 3 mm. longae. *Receptaculum* sparse puberulum. *Calycis* segmenta 5, deltoidea, 0·5 mm. longa. *Corolla* alba (ex *Kerr*), dorso fere glabra ; tubus 4 mm. longus, intra 1 mm. infra apicem annulo denso pilorum alborum instructus ; lobi 5, lineares, acuti, circa 4·5 mm. longi et 0·75 mm. lati, dorso gabri, apice medio alati, intra furfuracei. *Discus* carnosus, conspicuus. *Stamina* 5, inclusa, filamentis circa 1 mm. longis glabris 1 mm. supra corollae tubi basem insertis, antheris circa 1·5 mm. longis. *Stylus* 6·5 mm. longus, parce puberulus ; stigmata rotundata, 1 mm. diametro.

Doi Angka, 1300 m., dense evergreen forest, *Kerr* 5284.

Ophiorrhiza approximata *Craib* [Rubiaceae-Hedyotideae] ; *O. aggregatae* Craib habitu similis sed caule iuventute pilis brevibus ferrugineis subadpressis obtecto, haud glabro distinguenda.

Caules circa 30 cm. alti, basi lignosi, primo dense crispatim subadpresse ferrugineo-pubescentes. *Folia* oblongo-oblanceolata, oblongo-elliptica, vel elliptica, apice obtuse subacuminata, basi saepe parum inaequilateralia, cuneata, ad 14 cm. longa et 6·5 cm. lata, chartacea, sicco viridia, subtus pallidiora. supra marginem versus setulis paucis brevibus instructa, subtus ad nervos ferrugineo-puberula, aliter setulis brevibus inconspicuis sparse instructa, costa supra conspicua vel impressa subtus prominente, nervis lateralibus utrinque 12–14 pagina utraque conspicuis vel subtus prominulis, nervulis paucis pagina utraque conspicuis, petiolo 1–3·3 cm. longo suffulta ; stipulae 1 cm. longae, ad medium bilobatae, deciduae. *Inflorescentia* terminalis, pedunculo communi ad 7 mm. longo ferrugineo-tomentoso suffulta, compacta, 1·5 cm. diametro ; pedicelli breves. *Receptaculum* 1·5 mm. longum, sulcatum, puberulum. *Calycis* segmenta deltoidea, subacuta, 0·6 mm. longa, dorso puberula, ciliolata, dorso medio incrassata. *Corolla* alba (ex *Kerr*), extra puberula ; tubus 4 mm. longus, intra paulo supra medium annulo pilorum brevium instructus ; lobi 5, inter se parum inaequales, oblongi vel oblongo-deltoidei, obtusi, 2–2·5 mm. longi, 1–1·2 mm. lati, sat crassi. *Stamina* 5 ; filamenta 1·5 mm. longa, glabra, 0·75 mm. supra corollae tubi basem affixa ; antherae lineares, 2 mm. longae, basifixae, loculis acutis vel brevissime apiculatis. *Stylus* stigmatibus fusiformibus subacutis inclusis 3·5 mm. longus, parce puberulus.

Puket, Katu, 50 m., evergreen forest, *Kerr* 17569.

Ophiorrhiza bambusetorum *Craib* [Rubiaceae-Hedyotideae] ; ab *O. argentea* Wall. ex G. Don, cui habitu subsimilis, foliis floribusque maioribus, antheris multo longioribus recedens.

Caules annui, circa 15 cm. alti, iuventute dense crispatim ferrugineo-puberulo-tomentelli, basi lignosi. *Folia* opposita, paribus inter se fere aequalibus, oblongo-lanceolata vel oblongo-ovata, apice obtuse subacuminata, basi cuneata vel rotundato-cuneata, 7–11 cm. longa, circa 3 cm. lata, chartacea, sicco supra plumbea, subtus pallida, pagina superiore glabra, inferiore ad nervos crispatim ferrugineo-puberula, aliter setuloso-puberula, costa supra conspicua vel impressa subtus prominente, nervis lateralibus utrinque circa 12 supra subconspicuis subtus fere prominulis, petiolo 0·3–1·5 cm. longo suffulta ; stipulae alte bifidae, circa 6 mm. longae, deciduae. *Inflorescentia* terminalis, pedunculo communi ad 2 cm. longo ferrugineo-tomentello suffulta, ad 2 cm. longa et 3 cm. diametro ; pedicelli breves vel receptaculo paulo longiores, densius puberuli. *Receptaculum* 1·25 mm. longum, puberulum. *Calycis* segmenta 5, deltoidea, circa 0·75 mm. longa. *Corolla* subpunicea (ex *Kerr*), dorso puberula ; tubus circa 7·5 mm. longus, intra paulo supra staminum insertionem pilosus ; lobi 5, ad 3·5 mm. longi et 2 mm. lati. *Stamina* 5, filamentis 3 mm. longis glabris 2·25 mm. supra corollae tubi basem insertis, antheris linearibus 2·25 mm. longis. *Stylus* 3 mm. longus ; stigmata ambitu subovata, obtusa, fere 2 mm. longa.

Surat, Sawng Pi Nawng, 50 m., bamboo forest, *Kerr* 12383.

Ophiorrhiza bicolor *Craib* [Rubiaceae-Hedyotideae] ; ab *O. membranacea* Craib foliis paulo sed distincte crassioribus, receptaculo puberulo, antheris brevioribus recedit.

Caules annui, ad 1 m. alti (ex *Kerr*), glabri, brunnei, primo angulati, mox teretes, ad 4 mm. diametro. *Folia* opposita, paribus inter se aequalibus vel subaequalibus, lanceolata, oblongo-lanceolata, vel interdum elliptico-ovata, apice obtuse acuminata, basi cuneata vel acuminato-cuneata, lateribus saepe inter se parum inaequalibus, 7–14 cm. longa, 3–6 cm. lata, chartacea vel rigide chartacea, sicco supra viridia vel fusco-viridia, subtus pallida, supra marginem versus setulis paucis brevibus instructa, subtus glabra, costa supra conspicua subtus prominente, nervis lateralibus utrinque 8–10 pagina utraque conspicuis, nervulis paucis subtus conspicuis, petiolo 1–3 cm. longo suffulta ; stipulae cito deciduae, ultra medium vel fere ad basem bifidae, vix 1 cm. longae. *Inflorescentia* terminalis, pedunculo communi brevi vel ad 2 cm. longo longius crispatim subferrugineo-puberulo suffulta, congesta, circa 2 cm. diametro, ramis cum pedicellis brevibus breviter subferrugineo-pubescentibus. *Receptaculum* puberulum, paulo ultra 1 mm. longum. *Calycis* segmenta deltoidea, circa 0·75 mm. longa. *Corolla* alba (ex *Kerr*) ; tubus 6 mm. longus, 2 mm. infra apicem annulo denso pilorum alborum intra instructus ; lobi 5, circa 1·5 mm. longi. *Stamina* bene inclusa ; filamenta 0·5 mm. longa, glabra, 1 mm. supra corollae tubi basem inserta ; antherae fere 1·75 mm. longae. *Stylus* 5 mm. longus, stigmatibus 1 mm. longis ambitu oblongo-ellipticis.

Pang-nga, Kao Katakwam, 900 m., evergreen forest, *Kerr* 18480.

Ophiorrhiza calcarea *Craib* [Rubiaceae-Hedyotideae]; ab *O. bicolore* Craib ramulis bifacialiter crispatim puberulis, foliis tenuioribus, stipulis deciduis, inter alia recedens.

Caules annui, bifacialiter crispatim mox furfuraceo-puberuli, primo angulati, mox teretes, ad 3 mm. diametro, brunnei vel demum substraminei. *Folia* opposita, paribus inter se subaequalibus, ovato-lanceolata vel oblongo-lanceolata, apice obtuse acuminata vel subacuminata, basi saepe parum inaequilateralia, cuneata vel rotundata, 10–16 cm. longa, 3–5·5 cm. lata, membranacea vel chartaceo-membranacea, sicco subtus pallidiora, supra sparse setulosa sed marginem versus setulis brevioribus et magis numerosis, subtus glabra, costa supra conspicua subtus prominente, nervis lateralibus utrinque circa 10 pagina utraque conspicuis vel inferiore subprominulis, margine setuloso-ciliolata, petiolo 1–2 cm. longo suffulta; stipulae deciduae. *Inflorescentia* terminalis, pedunculo communi 1·5–4 cm. longo crispatim ferrugineo-puberulo suffulta, ad 6 cm. diametro; pedicelli receptaculo subaequilongi vel eo paulo longiores. *Receptaculum* paulo costatum, puberulum, 1 mm. longum. *Calycis* segmenta late deltoidea, obtusa, 0·5 mm. longa. *Corolla* alba (ex *Kerr*); tubus 5 mm. longus, intra medio pilosus; lobi 5, oblongi, 2 mm. longi, 1 mm. lati. *Stamina* 5, filamentis 3·5 mm. longis glabris 1·25 mm. supra corollae tubi basem insertis, antheris exsertis 1·5 mm. longis. *Stylus* 2 mm. longus; stigmata 1·5 mm. longa, longius acuminata.

Krabi, 50 m., evergreen forest at foot of limestone hill, *Kerr* 18851.

Ophiorrhiza condensa *Craib* [Rubiaceae-Hedyotideae]; inter species caule iuventute pilis obtecto et antheris haud 2 mm. longis inflorescentia parva terminali subcapitata cognoscenda.

Caules annui, 15–23 cm. alti, primo ferrugineo-tomentelli, mox crispatim ferrugineo-puberuli, brunnei. *Folia* opposita, paribus inter se fere aequalibus, oblongo-lanceolata vel suboblonga, apice obtuse acuminata vel subacuminata, basi haud rarius inaequilateralia, cuneata vel rotundato-cuneata, ad 11 cm. longa et 3·8 cm. lata, chartacea vel fere membranacea, sicco supra viridia, subtus pallida, supra sparse setulosa sed apud marginem setulis brevioribus et magis numerosis, subtus ad nervos crispatim ferrugineo-puberula, aliter setuloso-puberula, costa supra conspicua subtus prominula, nervis lateralibus utrinque 10–12 supra conspicuis subtus subprominulis intra marginem anastomosantibus, margine breviter setuloso-ciliata, petiolo usque ad 2 cm. longo suffulta; stipulae circa 1 cm. longae, deciduae, inter se plus minusve connatae sed saepissime fere e basi liberae. *Inflorescentia* terminalis, pedunculo communi circa 3 mm. longo dense puberulo suffulta, sub anthesin haud 1 cm. diametro, compacta, pedicellis dense puberulis ad 1 mm. longis. *Receptaculum* puberulum, vix 1 mm. longum. *Calycis* segmenta deltoidea, obtusiuscula, circa 0·5 mm. longa. *Corolla* alba (ex *Kerr*), extra puberula; tubus 4 mm. longus, intra sub apicem annulo denso

pilorum alborum instructus ; lobi 5, lineares, 2·5 mm. longi. *Stamina* 5, ad pilorum annulum attingentia, filamentis brevibus, antheris linearibus vix 2 mm. longis. *Stylus* puberulus, 5 mm. longus, stigmatibus latis.

Kanburi, Wangka, 400 m., bamboo forest, *Kerr* 10436.

Ophiorrhiza kratensis *Craib* [Rubiaceae-Hedyotideae] ; ab *O. scabrella* Ridl. corolla extra subglabra inter alia distinguenda.

Caules 15–40 cm. alti, basi lignosi, simplices vel superne ramosi, iuventute dense adpresse ferrugineo-pubescentes, mox puberuli. *Folia* opposita, paribus inter se fere aequalibus, lanceolata ovatave, apice obtuse subacuminata, basi haud rarius parum inaequilateralia, cuneata vel interdum rotundata, 6–12 cm. longa, 2–3·7 cm. lata, chartacea, sicca supra fuscescentia, subtus pallide viridia, supra sparse inconspicue setulosa, setulis marginem versus magis numerosis et brevibus, subtus ad nervos ferrugineo-puberula, costa supra saepissime impressa subtus prominente, nervis lateralibus utrinque 8–10 supra conspicuis subtus prominulis intra marginem anastomosantibus, petiolo ad 1·7 cm. longo suffulta ; stipulae 2–3 mm. longae, deciduae. *Inflorescentia* terminalis, sublaxa, pedunculo communi usque ad 2 cm. longo adpresse ferrugineo-pubescente suffulta, pedicellis usque ad 2 mm. longis puberulis. *Receptaculum* 1·25 mm. longum, costatum, puberulum. *Calycis* segmenta 5, deltoidea, 0·75 mm. longa, dorso carinata. *Corolla* dorso subglabra ; tubus circa 7 mm. longus, intra medio annulo denso pilorum alborum instructus ; lobi 5, oblongo-lanceolati vel suboblongi, 3 mm. longi, 1·75 mm. lati. *Stamina* ad corollae tubi basem posita, filamentis brevibus glabris 1 mm. supra corollae tubi basem insertis, antheris linearibus 1·5 mm. longis. *Stylus* vix 5 mm. longus ; stigmata subrotundata, circa 1 mm. diametro.

Krat, Kao Kuap, *Put* 2950.

Ophiorrhiza longifolia *Craib* [Rubiaceae-Hedyotideae] ; ab *O. scabrella* Ridl. calycis segmentis longioribus, corollae tubo pro rata multo longiore, ab *O. merguense* (Hook. f.) foliis pro longitudine angustioribus recedit.

Caules 10–25 cm. alti, basi lignosi, iuventute densius crispatim ferrugineo-pubescentes. *Folia* opposita, paribus inter se inaequalibus, oblongo-lanceolata, elongato-lanceolata, vel rarius suboblonga, apice obtuse acuminata, basi cuneata, interdum acuminato-cuneata, haud rarius inaequilateralia, 5·5–13 cm. longa, 1·7–4·2 cm. lata, membranaceo-chartacea, sicco supra viridia, subtus pallida, pagina superiore setulis sparsis brevibus et marginem versus brevioribus et magis numerosis instructa, inferiore ad nervos crispatim ferrugineo-puberula, costa supra conspicua subtus prominula, nervis lateralibus utrinque 10 pagina utraque conspicuis, petiolo 0·8–2·3 cm. longo suffulta ; stipulae 1 cm. longae, angustae, fere e basi inter se liberae. *Inflorescentia* terminalis, pedunculo communi circa 2 cm. longo ferrugineo-tomentello suffulta, circa

1 cm. longa et 3 cm. lata. *Receptaculum* puberulum, 1 mm. longum. *Calycis* segmenta receptaculo subaequilonga. *Corolla* alba (ex *Kerr*), extra puberula ; tubus 7 mm. longus, intra 2 mm. infra apicem annulo denso pilorum alborum instructus ; lobi 1·75 mm. longi. *Stamina* bene inclusa ; filamenta glabra, circa 1·5 mm. supra corollae tubi basem inserta ; antherae 1·5 mm. longae. *Stylus* circa 6 mm. longus, pilis paucis instructus ; stigmata brevia, acuta.

Trang, Chawng, 100 m., evergreen forest, *Kerr* 15163.

Ophiorrhiza longipes *Craib* [Rubiaceae-Hedyotideae] ; *O. Lacei* Craib habitu subsimilis sed bracteis elongatis sub anthesin deficientibus distinguenda.

Caules 10–15 cm. alti, simplices, primo crispatim ferrugineo-pubescentes. *Folia* opposita, paribus inter se aequalibus, late ovata, subelliptica, vel elliptica, saepissime apice obtusa, basi late cuneata vel truncata, 3·5–7 cm. longa, 2·5–4·2 cm. lata, subchartacea, sicca supra viridia, subtus pallida, pagina superiore setulis sparsis et marginem versus brevioribus et magis numerosis instructa, inferiore ad nervos nervulosque crispatim puberula, costa supra conspicua subtus prominente, nervis lateralibus utrinque 7–8 supra conspicuis subtus prominulis, petiolo ad 1 cm. longo suffulta ; stipulae deciduae. *Inflorescentia* terminalis, pedunculo communi 2·5–4·5 cm. longo crispatim puberulo suffulta, 1·5 cm. diametro. *Receptaculum* puberulum, 1 mm. longum. *Calycis* segmenta 0·5 mm. longa. *Corolla* alba (ex *Kerr*), dorso subglabra vel omnino glabra, longitudinaliter alata ; tubus 3·75 mm. longus, intra 2 mm. supra basem annulo pilorum alborum instructus ; lobi 3 mm. longi, 1·5 mm. lati. *Stamina* ad pilorum annulum vix attingentia ; filamenta brevia, glabra, 0·5 mm. supra corollae tubi basem inserta ; antherae 1 mm. longae. *Stylus* 3·5 mm. longus.

Múang Tak, Mê Mue, 200 m., common in deciduous forest, *Kerr* 6162.

Ophiorrhiza membranacea *Craib* [Rubiaceae-Hedyotideae] ; ab *O. gracili* Kurz foliis latioribus brevius acuminatis, bracteis conspicuis sub anthesin deficientibus distinguenda.

Caules herbacei, glabri. *Folia* opposita, paribus inter se aequalibus vel inaequalibus, ovato-lanceolata, oblongo-ovata, vel subovata, apice acuminata vel subacuminata, obtusa, basi cuneata, acuminato-cuneata, vel subtruncata, ad 16 cm. longa et 6 cm. lata, membranacea, sicco viridia, subtus pallidiora, pagina superiore setulis sparsis instructa, inferiore glabra, nervis lateralibus utrinque circa 12 supra subconspicuis subtus subprominulis, margine breviter setuloso-ciliata, petiolo ad 4·5 cm. longo suffulta ; stipulae deciduae. *Inflorescentia* et terminalis et interdum ex axillis supremis orta, pedunculo communi circa 2 cm. longo suffulta, ramis brevibus vel ad 2·5 cm. longis, bracteis parvis deciduis, pedicellis receptaculis paulo brevioribus. *Receptaculum* circa 1·5 mm. longum, tenuiter costatum, glabrum. *Calycis* segmenta brevia. *Corolla* alba (ex *Kerr*) ; tubus

5·5 mm. longus, intra paululo supra medium annulo angusto pilorum alborum instructus ; lobi 5, circa 2 mm. longi, basi vix 1 mm. lati. *Stamina* 5, filamentis 2·5 mm. longis glabris 1·5 mm. supra corollae tubi basem affixis, antheris linearibus vix 2 mm. longis ad corollae tubi apicem attingentibus. *Stylus* 2 mm. longus, glaber, stigmatibus ambitu oblongo-lanceolatis subacutis.

Surat, Kao Nawng, 900-1000 m., evergreen forest, *Kerr* 13289.

Ophiorrhiza oblonga *Craib* [Rubiaceae-Hedyotideae] ; ab *O. argentea* Wall. ex G. Don foliis tenuioribus, corollae lobis oblongis, ab *O. fontinali* Ridl. calycis segmentis conspicue longioribus recedit.

Rhizoma lignosum, repens, caules erectos 7–15 cm. altos primo dense adpresse ferrugineo-pubescentes emittens. *Folia* opposita, paribus inter se saepissime inaequalibus, oblongo-lanceolata lateve lanceolata, apice saepissime subacute subacuminata, basi cuneata, 4–11 cm. longa, 1–2·3 cm. lata, chartacea, sicca supra plus minusve fuscescentia, subtus pallida, pagina superiore marginem versus sparse setulosa, aliter glabra, inferiore ad costam nervosque laterales parce crispatim ferrugineo-puberula, nervis lateralibus utrinque ad 10 pagina utraque conspicuis vel superiore subconspicuis, petiolo 0·5–1·4 cm. longo suffulta ; stipulae angustae, circa 3 mm. longae, saltem paucis diutius persistentibus. *Inflorescentia* terminalis, pedunculo communi 1–2·5 cm. longo breviter adpresse ferrugineo-pubescente suffulta, vix 1 cm. longa, ad 2 cm. lata ; pedicelli receptaculo subaequilongi. *Receptaculum* circa 1 mm. longum, costatum, furfuraceo-puberulum. *Calycis* segmenta 5, anguste deltoidea, circa 0·5 mm. longa. *Corolla* alba (ex *Kerr*), extra inferne parce furfuraceo-puberula ; tubus 5 mm. longus, intra paulo infra medium annulo pilorum alborum instructus ; lobi 2·25 mm. longi, dorso medio carinati. *Stamina* fere ad corollae tubi apicem attingentia ; filamenta 2·5 mm. longa, 0·5 mm. supra corollae tubi basem inserta ; antherae 1·6 mm. longae. *Stylus* 1·5 mm. longus, glaber ; stigmata plus minusve fusiformia, stylo subaequilonga.

Trang, Kao Soi Dao, 400 m., evergreen forest, *Kerr* 19157.

Ophiorrhiza patula *Craib* [Rubiaceae-Hedyotideae] ; inter species siamenses probabiliter *O. hispidulae* Wall. ex G. Don maxime affinis sed ab omnibus foliis subtus ad costam nervosque laterales pilis ferrugineis sat longis divergentibus conspicue instructis distinguenda.

Caules ad 40 cm. alti, ferrugineo-pubescentes, basi lignosi, ad 2 mm. diametro. *Folia* saepissime elliptico-oblonga, apice acuminata vel subacuminata, basi saepe parum inaequilateralia, cuneata vel late cuneata, 3–7 cm. longa, 1·5–3 cm. lata, chartacea, sicca brunnescentia, subtus pallidiora, supra setulosa, setulis ferrugineis vel rarius pallidis ad costam et marginem versus magis numerosis, subtus ad costam pilis ferrugineis divaricatis dense instructa, ad nervos laterales similiter sed minus densius tecta, aliter pilis similibus sparse instructa, costa supra conspicua subtus prominente, nervis lateralibus utrinque 8 supra subconspicuis subtus prominulis,

nervulis paucis subtus conspicuis, petiolo 5–15 mm. longo indumento ei caulium simili instructo suffulta ; stipulae filiformes, circa 5 mm. longae, deciduae. *Inflorescentia* et caules et ramulos breves laterales terminans, pedunculo communi 1·5–3·5 cm. longo ferrugineo-pubescente suffulta, 1–2·5 cm. diametro ; pedicelli breves. *Receptaculum* ferrugineo-pubescens, 1 mm. longum. *Calycis* segmenta 5, sublanceolata, subacuta, receptaculo subaequilonga, dorso ferrugineo-pubescentia. *Corolla* punicea (ex *Kerr*), dorso ferrugineo-subpilosa ; tubus 5 mm. longus, intra medio annulo denso pilorum alborum instructus ; lobi 2 mm. longi, 1·25 mm. lati, dorso medio alati. *Discus* carnosus, conspicuus. *Stamina* 5, ad pilorum annulum haud attingentia, filamentis brevibus glabris, antheris 1·25 mm. longis. *Stylus* 3·75 mm. longus, pilis paucis instructus ; stigmata 1 mm. longa, basi 0·75 mm. lata, obtusa.

Prachuap, Kao Luang, 1200 m., open scrub, *Kerr* 10853.

Ophiorrhiza plumbea *Craib* [Rubiaceae-Hedyotideae] ; ab *O. fontinali* Ridl. calycis segmentis conspicue longioribus, ab *O. merguense* (Hook. f.) foliis longioribus pro rata angustioribus distinguenda.

Caules e rhizomate lignoso ad 13 cm. alti, iuventute dense adpresse ferrugineo-subhirsuti. *Folia* opposita, paribus inter se subaequalibus vel saepe valde inaequalibus, saepissime oblongo-oblanceolata, apice obtuse acuminata vel subacuminata, rarius subrotundata, basi longius cuneata, 3–13 cm. longa, 1·2–3 cm. lata, subchartacea, supra viridi-plumbea, subtus griseo-viridia, pagina superiore marginem versus sparse adpresse setulosa, aliter glabra, inferiore ad costam nervosque crispatim ferrugineo- vel griseo-ferrugineo-puberula, costa supra conspicua saepe impressa subtus prominente, nervis lateralibus utrinque 8–12 supra subconspicuis subtus prominulis, nervulis paucis subtus conspicuis vel subprominulis, petiolo ad 1·3 cm. longo suffulta ; stipulae angustae, ad 5 mm. longae, deciduae. *Inflorescentia* terminalis, densa, pedunculo communi ad 4 cm. longo crispatim pallide ferrugineo-puberulo suffulta, circa 1 cm. longa et 1·5 cm. lata ; pedicelli receptaculo breviores. *Receptaculum* 1 mm. longum, costatum, puberulum. *Calycis* segmenta sublanceolata, circa 0·75 mm. longa. *Corolla* alba, apice punicea (ex *Kerr*), extra longius puberula ; tubus 4·25 mm. longus, intra paulo supra medium annulo denso pilorum alborum instructus ; lobi 5, circa 2·25 mm. longi. *Stamina* 5, ad pilorum annulum fere attingentia ; filamenta 0·75 mm. longa, 0·75 mm. supra corollae tubi basem inserta ; antherae 1·5 mm. longae. *Stylus* 3·5 mm. longus, pilis paucis oblique erectis instructus; stigmata complanata.

Pang-nga, Kao Katakwam, 700 m., evergreen forest, *Kerr* 18430.

Ophiorrhiza Ridleyana *Craib* [Rubiaceae-Hedyotideae] ; ab affini *O. scabrella* Ridl. calycis segmentis conspicue maioribus inter alia distinguenda.

Caulis erectus, 10–30 cm. altus, lignosus, basi ad 4 mm. diametro, iuventute densius brevius crispatim pubescens, demum puberulus. *Folia* late lanceolata vel oblongo-elliptica, apice saepissime subacuminata, obtusa, basi cuneata vel subacuminata, saepe parum inaequilateralia, 3·5–8·5 cm. longa, 1·3–3 cm. lata, chartacea, sicco supra viridia, subtus cinereo-viridia vel pallide brunnea, interdum purpurea, supra setulis saepissime cito deciduis sparse instructa et ad marginem setulis brevioribus magis numerosis persistentibus scabridula, subtus ad costam nervosque breviter subhirsuta, costa supra conspicua subtus prominente, nervis lateralibus utrinque 6–8 supra conspicuis subtus prominulis, petiolo 5–10 mm. longo supra canaliculato glabro aliter indumento ei caulis simili instructo suffulta ; stipulae deciduae. *Inflorescentia* terminalis, corymbiformis, circa 1 cm. longa et 1·5 cm. diametro, pedunculo communi 1–1·5 cm. longo densius breviter crispatim pubescente suffulta ; bracteae angustae, circa 1·5 mm. longae, deciduae ; flores albi (ex *Kerr*), breviter pedicellati. *Receptaculum* puberulum, 1·25 mm. longum. *Calycis* segmenta 5, deltoidea, obtusa, paululo ultra 1 mm. longa. *Corollae* tubus 3 mm. longus, dorso glaber, intra medio annulo denso pilorum alborum instructus, lobi 5, suboblongi, circa 2 mm. longi, dorso glabri, intra marginem versus breviter hirsuti. *Stamina* 5, filamentis 1·75 mm. longis glabris basem prope corollae tubi insertis, antheris circa 1·25 mm. longis. *Stylus* 3·5 mm. longus, pilis brevibus sparse instructus, stigmatibus latis obtusis.

Doi Sutep, 660 m., evergreen forest, *Kerr* 1174.

Ophiorrhiza ripicola *Craib* [Rubiaceae-Hedyotideae] ; ab *O. Griffithii* Hook. f. foliis floribusque sicco rubris, stipulis conspicue minoribus distinguenda.

Caules e rhizomate plures, erecti, circa 30 cm. alti, glabri, basi lignosi, complanati et sulcati, sicco rubri. *Folia* opposita, paribus inter se inaequalibus vel subaequalibus, parum variabilia, oblanceolata, obovato-oblanceolata, oblongo-elliptica, vel subelliptica, apice acute acuminata, basi cuneata vel acuminata, saepe parum inaequilateralia, 6–12 cm. longa, 2–4·8 cm. lata, chartaceo-membranacea, sicco supra viridia, ad costam et saepe ad nervos laterales rubra, subtus plus minusve rubra, supra setulis sparsis instructa, subtus glabra, nervis lateralibus utrinque circa 10 inferioribus saepe rectis et obliquis superioribus arcuatis et intra marginem anastomosantibus supra conspicuis subtus prominulis, costa supra conspicua subtus prominente, nervulis paucis pagina utraque conspicuis, petiolo 1·3–3·5 cm. longo glabro supra canaliculato suffulta ; stipulae deciduae, lanceolatae vel oblongo-lanceolatae, usque ad 5 mm. longae, integrae, glabrae. *Inflorescentia* terminalis, corymbiformis, primo subnutans, circa 2 cm. diametro, pedunculo communi ad 2·5 cm. longo suffulta, pedunculis partialibus 5–7 mm. longis cum pedunculo communi bifacialiter puberulis et sicco rubris ; bracteae lanceolatae vel oblongo-oblanceolatae, apice angustatae, subacutae, inferiores ad 10 mm. longae et 3 mm. latae, glabrae, sicco rubrae ;

bracteolae bracteis similes sed tantum circa 6 mm. longae et 1·5 mm. latae ; pedicelli crassi, ad 2 mm. longi, dense crispatim puberuli. *Receptaculum* oblatum, ad 1·5 mm. longum et 3·5 mm. latum, inferne puberulum, superne glabrescens. *Calycis* segmenta deltoideo-lanceolata, obtusa, 1 mm. longa, 0·5 mm. lata, glabra. *Corolla* alba (ex *Garrett*), sicco rubra, extra glabra ; tubus 1·5 cm. longus, intra parte triente inferiore glaber, superne pilosus ; lobi 5, oblongo-ovati, subacuti, ad 6 mm. longi et 3 mm. lati, intra pilis paucis instructi. *Stamina* 5, filamentis 1·5 mm. longis glabris 9 mm. supra corollae tubi basem insertis, antheris 2·75 mm. longis ad corollae tubi apicem attingentibus. *Discus* carnosus, conspicuus, calyce paululo altior. *Stylus* stigmatibus duobus complanatis inclusis 1·6 cm. longus, puberulus.

Doi Angka, source of Mê Wak, 2425 m., in stream and on banks, *Garrett* 326.

Ophiorrhiza Schmidtiana *Craib* [Rubiaceae-Hedyotideae] ; inter species siamenses antheris haud 2 mm. longis et corolla dorso glabra et costata, inflorescentia et terminali et axillari distinguenda.

Caules basi lignosi, 15–22 cm. alti, iuventute dense adpresse ferrugineo-subhirsuti. *Folia* opposita, paribus inter se subaequalibus vel valde inaequalibus, saepissime oblongo-lanceolata, apice obtusa vel subacuta, interdum subacuminata, basi cuneata, saepe inaequilateralia, 3–7 cm. longa, 1–2·5 cm. lata, chartacea, sicca supra viridia, subtus pallida, interdum purpureo-suffusa, pagina superiore parce setulosa, setulis marginem versus magis numerosis et brevioribus, inferiore ad costam nervosque crispatim ferrugineo-puberula, costa supra conspicua saepe impressa subtus prominente, nervis lateralibus utrinque 8–10 supra conspicuis subtus prominulis, nervulis paucis subtus subprominulis, petiolo 5–12 mm. longo suffulta ; stipulae parvae, deciduae. *Inflorescentia* et terminalis et axillaris, pedunculo communi 2–4 cm. longo primo dense ferrugineo-puberulo suffulta, ad 4 cm. lata ; pedicelli puberuli, receptaculo subaequilongi vel eo paululo longiores. *Receptaculum* circa 1 mm. longum, costatum, puberulum. *Calycis* segmenta 5, oblongo-lanceolata, obtusa, circa 0·75 mm. longa. *Corolla* alba, purpureo-suffusa (ex *Kerr*), extra glabra, costata ; tubus 4·5 mm. longus, intra medio annulo conspicuo pilorum alborum instructus ; lobi 5, elongato-deltoidei, 2 mm. longi, basi 1 mm. lati. *Stamina* e tubo paululo exserta ; filamenta circa 2·75 mm. longa, 0·5 mm. supra corollae tubi basem inserta ; antherae vix 2 mm. longae. *Stylus* 1 mm. longus ; stigmata acuta, circa 0·75 mm. longa.

Sukotai, Kao Luang, 500 m., evergreen forest, *Kerr* 5911.

Ophiorrhiza subaequalis *Craib* [Rubiaceae-Hedyotideae] ; inter species ramulis glabris vel bifacialiter puberulis ponenda, corollae lobis tubo tantum paululo brevioribus distinguenda.

Caules e rhizomate horizontali annui, ad 35 cm. alti, inferne lignosi, iuventute bifacialiter crispatim puberuli, angulati, cito

glabri, teretes, usque ad 2·5 mm. diametro. *Folia* opposita, paribus inter se aequalibus parumve inaequalibus, oblongo-lanceolata, oblanceolata, vel oblongo-obovata, apice obtuse subacuminata vel acuminata, basi acuminata, ad 8·5 cm. longa et 3 cm. lata, membranacea, supra viridia, subtus pallide viridia, pagina superiore setulis sparsis sed marginem versus magis numerosis inferiore setulis similibus sed praesertim ad nervos laterales instructa, nervis lateralibus utrinque 7–9 supra subconspicuis subtus subprominulis, nervis transversis vix conspicuis, petiolo 6–12 mm. longo suffulta ; stipulae deciduae, subfiliformes, 3 mm. longae. *Inflorescentia* terminalis, pedunculo communi circa 2 cm. longo crispatim puberulo suffulta, circa 2 cm. diametro ; pedicelli breves vel subnulli ; bracteae angustae, circa 3 mm. longae, deciduae. *Receptaculum* suboblatum, costatum, circa 1·5 mm. longum, glabrum. *Calycis* segmenta deltoidea, circa 0·5 mm. longa. *Corolla* alba (ex *Kerr*), dorso glabra vel apice pauperius puberula ; tubus 2·5 mm. longus, intra inferne glaber, apice densius barbatus ; lobi 5, lineari-oblongi, tubo subaequilongi, circa 0·5 mm. longi, intra glabri. *Stamina* 5, filamentis 1·25 mm. longis 0·75 mm. supra corollae tubi basem affixis, antheris 1 mm. longis ad corollae tubi apicem attingentibus. *Stylus* 4 mm. longus, inconspicue puberulus, stigmatibus ambitu subellipticis carnosis.

Loi, Kao Krading, 1200 m., evergreen forest, *Kerr* 8953.

Ophiorrhiza subpunicea *Craib* [Rubiaceae-Hedyotideae] ; *O. communi* Ridl. et *O. rosaceae* Ridl. facie similis, ab ambabus calycis segmentis maioribus et antheris conspicue longioribus recedit.

Caules erecti, 11–25 cm. alti, primo dense adpresse ferrugineo-subhirsuti. *Folia* opposita, paribus inter se subaequalibus vel conspicue inaequalibus, saepissime oblongo-elliptica vel oblongo-lanceolata, apice acute acuminata vel subacuminata, basi saepissime inaequilateralia, cuneata, acuminata, vel rarius rotundata, 5·5–11 cm. longa, 1·5–3·5 cm. lata, sicca plus minusve rubro-suffusa, subtus pallidiora, membranaceo-chartacea, supra ad marginem breviter setulosa, aliter glabra vel parce setosa, subtus ad costam nervosque crispatim ferrugineo-puberula, costa pagina utraque conspicua, nervis lateralibus utrinque 8–10 pagina utraque conspicuis, petiolo 5–13 mm. longo suffulta ; stipulae circa 4 mm. longae, deciduae. *Inflorescentia* terminalis, pedunculo communi 1–2 cm. longo indumento brevi adpresso ferrugineo tecto suffulta ; bracteae parvae, deciduae ; pedicelli breves vel receptaculo subaequilongi. *Receptaculum* circa 1 mm. longum, costatum, praesertim inferne densius adpresse ferrugineo-puberulum. *Calycis* segmenta lanceolata, acuta, circa 0·6 mm. longa. *Corolla* puniceo-alba (ex *Kerr*) ; tubus 5 mm. longus, primo costatus, extra parce ferrugineo-puberulus, intra paululo infra medium annulo pilorum alborum instructus et supra annulum furfuraceo-puberulus ; lobi 1·5 mm. longi, intra furfuraceo-puberuli. *Stamina* ad corollae tubi os attingentia ; filamenta 3 mm. longa, 1 mm. supra corollae tubi basem affixa ;

antherae 2·25 mm. longae. *Stylus* 1·75 mm. longus, glaber; stigmata fusiformia, acuta, circa 1 mm. longa.

Satul, Kao Keo Range, 700 m., evergreen forest, *Kerr* 14526.

Chirita Elphinstonia *Craib* [Gesneriaceae-Cyrtandreae]; a *C. Marcanii* Craib floribus minoribus magis numerosis, a *C. oculata* Craib corollae tubo intra bimaculato inter alia recedit.

Herba erecta, caule superne ramoso ad 90 cm. alto basi usque ad 2·5 cm. diametro glabro vel pilis perpaucis hic et illic instructo nitido viridi, internodiis inferne purpureo-suffusis, inferne lenticellis paucis conspicuis pallidis instructo. *Folia* opposita, elliptica vel oblonga, rarius obovato-oblonga, basi truncata, ad 15 cm. longa et 9 cm. lata, supra viridia, subtus pallide viridia, pagina superiore pilis erectis molliter pubescentia, inferiore pilis brevioribus magis rigidis sparsioribus instructa, nervis lateralibus utrinque paulo ultra 20 supra parum impressis subtus prominentibus, nervulis fere omnibus obscuris, margine ciliata, petiolo valido ad 3 cm. longo suffulta. *Cymae* cum ramulis petiolo adnatae, pedunculis partialibus usque ad 2 mm. inter se liberis, pedicellis sub anthesin adscendentibus mox erectis demum recurvis circa 1 cm. longis superne paulo incrassatis saepissime pilis paucis postice longitudinaliter instructis. *Calyx* viridis; segmenta 5, lineari-lanceolata, subobtusa, ad 11 mm. longa, dorso medio pilis sparsis rigidis instructa. *Corolla* lutea, tubo intra ad staminum insertionem purpureo-maculato, dorso breviter pubescens; tubus 15 mm. longus, a medio superne ampliatus; labium posticum e lobis duobus 4 mm. longis 6 mm. latis constitutum, intra inferne pilis glanduloso-capitatis instructum; lobus anticus circa 9 mm. longus et latus, lateralibus maior. *Stamina* 2, inclusa, antheris inter se connatis pallidis conspicue albo-barbatis, filamentis 4 mm. longis. *Discus* brevis, pistilli basem cingens. *Ovarium* circa 6 mm. longum, superne breviter sparse pubescens; stylus 1 cm. longus, sparse breviter pubescens, stigmate papilloso breviter bilamellato.

Described from plants raised at Aberdeen from seed of *Marcan* 2561, collected at Ban Keng, 30 m., limestone hill.

XVII.—ERYTHROPHYSA ALATA. J. Hutchinson.

Amongst a number of photographs of paintings of plants, made for Governor van der Stel on his expedition to Namaqualand in 1685, and submitted to Kew for determination by Professor Waterhouse of Trinity College, Dublin, was one which from description might be *Fagara alata* Eckl. & Zeyh. The type specimen of this was obtained from Sonder's herbarium in Vienna, and although a barren shoot, was no doubt the same species as depicted in the drawing. A further examination and search, however, showed the species to be misplaced in the family *Rutaceae* to which the genus *Fagara* belongs, and it was found to be identical with *Erythrophysa undulata* E. Mey., a genus belonging to the *Sapindaceae*.

Copy of photograph of painting of *Erythrophysa alata* (Eckl. & Zeyh.) Hutch., made for Governor van der Stel in Namaqualand in 1685. Reproduced by permission of Professor G. Waterhouse, Trinity College, Dublin.

Fagara alata was first collected by Ecklon and Zeyher, and they published a short description in their Enumeration in 1835 (p. 118). Harvey in the Flora Capensis vol. i (p. 446), retained it with considerable doubt in the *Rutaceae* as a species of *Xanthoxylon*, the name at that time in use for *Fagara*. Harvey and Sonder still had only the single barren specimen in the latter's herbarium, and they failed to connect it with *Erythrophysa undulata* E. Mey. included by them on p. 238 of the same work. As the name *Fagara alata* is older than *Erythrophysa undulata*, the following new combination is necessary :—

Erythrophysa alata (*Eckl. & Zeyh.*) *Hutch.* comb. nov.

Fagara alata Eckl. & Zeyh. Enum. 118 (1835). *Xanthoxylon*? *alatum* Steud. Nom. ed. 2, ii. 796 (1841) ; Harv. in Harv. & Sond. Fl. Cap. i. 446. *Erythrophila undulata* Arn. in Hook. Journ. Bot. iii. 258 (1841). *Erythrophysa undulata* E. Mey. in Drege Zwei

Pflanzengeogr. Docum. 183, nomen (1843); Harv. & Sond. Fl. Cap. i. 237 (1860).

Distribution :—Clanwilliam Div. : near Louisfontein, *Ecklon & Zeyher* 923. Little Namaqualand : common on hillside above Twee Rivieren, fr. Sept., *Pearson* 6498; granite slopes on both sides of pass north of Garies, fr. Dec., *Pearson* 5624. Brackdam, 1500 ft., fr. Sept., *Schlechter* 11,112; Uitkomst, 2000–3000 ft., fl. Aug., *Drege*; near Ookiep, *Foxwell*; bewteen Ookiep and Spektakel, about 2000 ft., fr. Aug.-Sept., *Bolus* 9486.

XVIII.—NOTES ON AFRICAN GRASSES: XII.*

S. M. Stent.

A New Genus from the Orange Free State.

Tarigidia *Stent*, gen. nov.; affinis *Digitariae* Hall., sed spiculis in ramis brevibus paniculae spiciformis dispositis, gluma inferiore elongata differt.

Spiculae anguste ellipticae, elliptico-lanceolatae vel lanceolato-oblongae, subacutae vel acutae, muticae, dorso compressae, infra glumas tarde disarticulatae, dense imbricatae, secundae, in ramis brevibus paniculae spiciformis dispositae. *Anthoecia* duo : inferius ad lemma redactum; superius ♀. *Glumae* dissimiles, spicula breviores; inferior abaxialis, lanceolata vel ovato-lanceolata, tenuiter acuta vel acuminata, firme membranacea, uni- vel trinervis; superior ovata, acuta vel subacuminata, membranacea, trinervis, pilosa. *Anthoecium inferum* sterile : lemma spiculam aequans, elliptico-oblongum vel oblongo-lanceolatum, acutum, 7-nerve, pilosum, firme membranaceum; palea minuta, hyalina, biloba. *Anthoecium superum* ♀, inferum aequans, late lanceolatum, acutum : lemma explanatum late ellipticum, obtusum, trinerve, tenuiter chartaceum, marginibus planis membranaceis; palea lemma aequans, tenuiter chartacea, binervis. *Lodiculae* minutae, cuneatae. *Stamina* 3, antheris linearibus. *Styli* basi connati; stigmata plumosa. *Caryopsis* ignota.—Gramen perenne; foliorum laminae lineares; panicula angusta; rami basi disarticulati; spiculae pilosae.

Species 1, Africae australis incola.

T. aequiglumis *Stent*, comb. nov.; species unica. *Gramen* perenne, dense caespitosum, 1–1·5 m. altum, innovationibus intravaginalibus. *Culmi* e rhizomate brevi erecti vel geniculato-adscendentes, teretes, subvalidi, simplices vel ramosi, 3–5-nodes, glabri laevesque, infra paniculam tenuiter striati. *Foliorum vaginae* carinatae, laxiusculae, chartaceae, marginibus tenuibus, inferiores internodiis aequales vel longiores, plus minusve pilosae vel villosae, superiores internodiis breviores, glabrescentes vel glabrae, ore auriculatae, auriculis ad ligulam adnatis; ligulae oblongae, truncatae, ad 5 mm. longae, tenuiter membranaceae, glabrae; laminae anguste

*Continued from *K.B.* 1929, 323.

lineares, apice tenuiter acutae vel subsetaceae, ad 25 cm. longae, 3–4 mm. latae, planae, supra ubique et subtus apicem versus scaberulae, ceterum laeves, glabrae vel basin versus pilis paucis pilosae, pone ligulam saepe breviter dense pubescentes, costa media tenui albida infra prominente, marginibus cartilagineis. *Panicula* erecta, cylindrica, spiciformis, densa vel inferne interrupta, 8–11 cm. longa, 5–7 mm. lata, villosa, pallida vel purpurea; rhachis 4-angulata vel triquetra, angulis scaberulis, glabra vel nodis breviter barbata; rami subtriquetri, secundi, usque basin dense spiculati, erecti, appressi, basi molliter pilosi, marginibus sparse ciliati et scaberuli, inferiores 1–1·5 cm. longi, superiores sensim decrescentes; pedicelli bini, brevissimi, teretes. *Spiculae* 4–4·5 mm. longae. *Gluma* inferior 2·5–3 mm. longa, glabra vel dorso sparse pilosa, marginibus scabridis; gluma superior 2·75–3·5 mm. longa, marginibus et inter nervos longe denseque pilosa, apice subglabra et scaberula. *Anthoecium inferum*: lemma supra medium secus carinas pilis patentibus mollibus ad 2·5 mm. longis e tuberculis ortis pilosum, raro etiam infra medium inter nervos pilosum. *Anthoecium superum*: lemma glabrum, pallide stramineum. *Antherae* 2–2·5 mm. longae.—*Anthephora aequiglumis* Goossens in Trans. Roy. Soc. S. Afr. xx. 195, fig. 3 (1932).

South Africa. Orange Free State: Hoopstad District; Odendaalsrust, on an empty plot, *Schultz in Nat. Herb. Pretoria* 8344 (type). Kroonstad District; Groenebloem Station, *Potts* 2674.

The structure of the spikelet is very similar to that of *Digitaria*, but the elongated lower glume and the type of inflorescence place *Tarigidia* beyond the limits of that genus. The lemma of the upper floret has the same characteristic flattened broad thin margins, whilst the very much reduced palea of the sterile lower floret may be found attached to the base of the upper floret as in the genus *Digitaria*. It is probable that the spikelets are often more or less persistent as the short branches easily disarticulate at the base from the rhachis of the inflorescence. This character, together with the spiciform panicle and the somewhat similar structure of the spikelets, no doubt led Mr. Goossens to place our plant in the genus *Anthephora*.

The name *Tarigidia* is an anagram of *Digitaria*.

XIX.—NOTES ON THE FLORA OF SOUTHERN AFRICA: I. Miscellaneous observations. R. A. Dyer.

Malvaceae.

Pavonia Burchellii (*DC.*) *R. A. Dyer*, comb. nov.—The necessity for this new combination is indicated in the following notes. De Candolle, Prodr. i. 438 (1824), described *Burchell* 2557 as *Althaea Burchellii*, a plant to which Burchell in his Catalogue MSS. had applied the name *Urena pilosa*. Confusion in the identity of Burchell's plant was first caused by Ecklon and Zeyher, Plant. Afr. Austr. 37 (1835), who erroneously referred their no. 300 to *Althaea*

Burchellii DC. Thus Harvey, in Harv. & Sond. Fl. Cap. i. 159 (1859-60), who had not seen Burchell's type, retained De Candolle's original diagnosis, and at the same time made the following note on Ecklon and Zeyher's specimen :—" The plant distributed by E. & Z. under this name is an undoubted *Pavonia* (*P. mollis* E. Mey.)."

Ulbrich, in Engl. Bot. Jahrb. lvii. 125 (1922), places *Pavonia macrophylla* E. Mey. ex Harv. as a synonym of the older name *P. Kraussiana* Hochst. (1844) and cites with the former, *Burchell* 2557, and again cites the number in the text, but makes no reference there to *Althaea Burchellii* DC. (1824) of which, as stated, *Burchell* 2557 is the type. Subsequently, however, Ulbrich, l.c. 135, evidently basing his opinion on Harvey, l.c., cites " *Althaea Burchellii* Eckl. et Zeyh. (n. 300) DC. Prodr. l.c." and *Pavonia mollis* E. Mey. as synonyms of *P. columella* Cav. (1787).

Both *Burchell* 2557 and *Ecklon* and *Zeyher* 300 are in Kew Herbarium and are entirely distinct. On the other hand the type specimens of *Pavonia macrophylla* E. Mey. ex Harv. and *P. Kraussiana* Hochst. agree very closely with Burchell's plant. *P. Burchellii* occurs frequently in the Karroo and karroid areas throughout the Cape, extending to Orange Free State, Natal and Transvaal.

The main synonymy is as follows :—*Althaea Burchellii* DC. l.c. (1824) ; *Urena pilosa* Burch. Cat. 2557 ex DC. l.c. ; *Pavonia Kraussiana* Hochst. in Flora, xxvii. 293 (1844) ; *P. macrophylla* E. Mey. ex Harv.

Pavonia Meyeri *Mast.* in Oliv. Fl. Trop. Afr. i. 191 (1868). Although Ulbrich, l.c., cites the South African species *P. mollis* E. Mey. ex Harv. and *P. Meyeri* Mast. as synonymous with *P. columella* Cav., a Bourbon species, it is considered that the plants represent distinct species. *P. mollis* E. Mey. ex Harv. (1859), however, is a later homonym of *P. mollis* H. B. & K. Nov. Gen. et Sp. v. 282 (1821). In consequence Masters, l.c., applied the specific epithet *P. Meyeri* to the South and Central African plants and this is therefore resuscitated.

The main synonomy is :—*P. mollis* E. Mey. ex Harv. non H. B. & K. l.c. ; *Althaea Burchellii* Eckl. & Zeyh. non DC. l.c. ; *Pavonia columella* Ulbr. l.c. in part, non Cav.

Tiliaceae.

Corchorus aspleniifolius *Harv.* in Harv. & Sond. Fl. Cap. i. 229 (1859-60), non Burch. It is very probable that Harvey's description, l.c., was made from Dr. Atherstone's specimen which he cites doubtfully from Grahamstown. He had none of Burchell's specimens at his disposal at the time. There is also reason to believe that Dr. Atherstone's plant actually came from Bechuanaland, for he made botanical collections in that area, and presumably later posted them from Grahamstown where he was domiciled. Further, Dr. Atherstone's specimen agrees very closely with *Burchell* 2337

from Last Water Station in the Chooi Desert, and 2431 from near Kuruman, Bechuanaland. As stated, Harvey had not seen *Burchell* 1737, the type of *C. aspleniifolius* Burch., and it is quite distinct from the above three specimens, which must therefore be given a new name.

Hochreutiner, Jard. Bot. Geneve, 125 (1914), described *Corchorus arenicola* based on a specimen from Litakoun in Bechuanaland, and it appears from his description and notes that *Burchell* 2337, 2431 and Dr. Atherstone's plant may well be placed under *C. arenicola* Hochr., with *C. aspleniifolius* Harv. non Burch. as a synonym.

STERCULIACEAE.

Hermannia stellulata (*Harv.*) *K. Schum.* in Engl. Mon. Afr. Pl. v. 74. In view of my note under *Corchorus aspleniifolius* Harv. non Burch., questioning the validity of the locality of Dr. Atherstone's plant cited by Harvey, the present case is also of importance. The type of *Mahernia stellulata* Harv. in Harv. & Sond. Fl. Cap. i. 216 (1859-60) is quoted from Grahamstown, without collector's name. One might well take *Corchorus aspleniifolius* Harv. and *Mahernia stellulata* Harv. as an example of parallel development, for their vegetative appearance is remarkably similar. I have seen no other specimen from Grahamstown which agrees with the type of *Mahernia stellulata* Harv., but as in the case of *Corchorus aspleniifolius*, specimens collected by Burchell (2334) in Bechuanaland, agree very closely. This suggests that the type of *Mahernia stellulata* Harv. came from Bechuanaland and not from near Grahamstown. Evidence which greatly strengthens this view is the presence of the same micaceous sand adhering to both Burchell's specimen and the type. A further examination of Dr. Atherstone's plant of *Corchorus aspleniifolius* Harv. non Burch. established the presence of a small amount of the same type of sand. This plant and the type of *Mahernia stellulata* Harv. without collector's name were both in Herb. Hook. (now Herb. Kew.) and it is suggested that the latter was also collected by Dr. Atherstone in Bechuanaland.

Hermannia jacobeifolia (*Turcz*) *R. A. Dyer*, comb. nov.—Harvey, in Harv. & Sond. Fl. Cap. i. 212 (1859-60), quotes this species as a synonym of *Mahernia bipinnata* Linn. which appears to have been first validly published by De Candolle, Prod. i. 496 (1824), and in the Index Kewensis De Candolle is given as the author. Glover, Ann. S. A. Mus. ix. 197 (1915), made the combination *Hermannia bipinnata* (Linn.) Glover " (*Mahernia bipinnata* Linn. non. Burch.)," and evidently overlooked the fact that Burchell published his plant as a *Hermannia* and not a *Mahernia*. Thus, according to the International Code, *Hermannia bipinnata* Glover is a later homonym and must have a new name. The oldest valid synonym has therefore been resuscitated.

The main synonymy is as follows :—*Mahernia jacobeaefolia* Turcz. Bull. Soc. Nat. Mosc. xxxi, 220 (1858) ; *Mahernia pinnata*

Cav. Diss. vi. t. 176, fig. 2 (1788) non Linn. ; *Mahernia bipinnata* Linn. ex DC. Prod. i. 496 (1824) excl. syn. *Hermannia pinnata* Linn. Sp. Pl. ii. 943 (1763) ? ; *Mahernia bipinnata* Harv. in Harv. & Sond. Fl. Cap. i. 212 (1859-60) ; *Hermannia bipinnata* (Linn.) Glover, l.c., non Burch., Trav. i. 310 (1822).

The type of this species is *Drege* 7316 (in part) collected in the Graaff Reinet Div. on the Sneeuwbergen, 5000 ft. This specimen was also quoted by Harvey, l.c. The species occurs occasionally in the Karroo of the Cape and Orange Free State and extends eastwards to the Zwart Kei River. This latter locality is recorded on Mrs. Barber's specimen in the Kew Herbarium and instead of Albany Div., Queenstown Div. should be substituted.

Hermannia resedifolia (*Burch. ex DC.*) *R. A. Dyer*, comb. nov. This species is very closely allied to *H. jacobeifolia* (Turcz.) R. A. Dyer, but differs in the leaves being pinnate, not bipinnate, and *Burchell* 2280 (type) collected near the source of Moshowing River near Takun, Bechuanaland, is more luxuriant and less glandular-pubescent than *Drege* 7316. Other specimens, however, show a breaking down of the differences. With a larger range of specimens accompanied by field notes, it might be found necessary to unite the two species in which case *H. resedifolia* (DC.) R. A. Dyer would have priority.

PLUMBAGINACEAE.

In view of the fact that the South African plants previously included in the genus *Statice* Linn. must be referred to *Limonium* Mill. (Sprague in Journ. Bot. lxii. 267), it is necessary to make four new combinations. They are as follows :—**L. amoenum** (*C. H. Wright*) *R. A. Dyer* ; **L. anthericoides** (*Schlechter*) *R. A. Dyer* ; **L. avenaceum** (*C. H. Wright*) *R. A. Dyer* ; **L. equisetinum** (*Boiss.*) *R. A. Dyer*. All the other combinations except *L. purpuratum* (Linn.) Hubbard, were made by O. Kuntze, Rev. Gen. Plant. ii. 395-6.

XX.—MISCELLANEOUS NOTES.

MR. JOHN COUTTS.—The Minister of Agriculture and Fisheries has appointed Mr. J. Coutts, Assistant Curator in charge of the Decorative Department, as Curator in succession to the late Mr. T. W. Taylor.

DR. N. E. BROWN.—The University of the Witwatersrand, Johannesburg, has conferred the Honorary Degree of Doctor of Science on Mr. N. E. Brown, A.L.S., in recognition of his work on the S. African flora. At the request of the Professor of Botany of the University and to mark the conferment of the degree, the Director presented Dr. Brown to his colleagues in the Herbarium of the Royal Botanic Gardens, Kew, on March 19th.

Thomas William Taylor.—The death of Mr. T. W. Taylor on March 4th, which we recorded with deepest regret in the last number of the *Bulletin*, is another very sad loss to Kew. Mr. Taylor was taken ill last December and went into hospital for treatment hoping that only a slight operation would be necessary. After some weeks in hospital, during which time his illness became of a painful nature, an operation was performed and revealed that his condition was critical, and though he rallied well he succumbed a week after the operation had been performed.

Mr. Taylor's untimely death at the early age of 53, so soon after his appointment to the responsible position of Curator, in May 1929, is a great loss to the personnel of the establishment, and all the more so since it has occurred so soon after the lamented death of Dr. T. F. Chipp.

Mr. Taylor was born in Gloucestershire in June 1878, but by association he was more a man of our own neighbourhood, for his father was gardener at Manor House, Ham, and it was under him that he started his career; afterwards he acquired experience at Heythrop Park, on the borders of his native county, and in the famous nurseries of Messrs. James Veitch & Son. He entered Kew as a Student Gardener in 1902, and was promoted to the position of Foreman of the Temperate House in 1906, and later, with the title Assistant Curator, he had charge of all the Tropical Departments. He was promoted to the office of Curator on the retirement of Mr. W. J. Bean. His rise to this, the most important post in botanical horticulture, was due to his great skill as a cultivator, his industry, his capacity as a manager of men, and his love for and great knowledge of plants, especially of Orchids. While he was in charge of the Tropical Departments he was sent by the Director on a tour to the East, and visited Malaya, Java and Ceylon for the purpose of studying tropical vegetation under its native conditions, and more especially to collect and bring home stocks of bananas for cultivation, under quarantine conditions, at Kew for ultimate transmission to the Imperial College of Tropical Agriculture, Trinidad. This was in connection with the research work which is being carried on there in the breeding of strains of bananas resistant to the Panama disease, which is threatening the banana industry in the west Indies. This visit to the Tropics, the first ever undertaken by a Curator of Kew, was rendered possible by the grant to Kew from the Empire Marketing Board for the development of the cultivation of economic plants within the Empire.

On his return to Kew, Mr. Taylor had the opportunity of applying the result of his experience in a practical manner, for plans for carrying out certain alterations in the Tropical Fern House just then received sanction from H.M. Office of Works, and the arrangement of the south bay of the house in the semblance of a Tropical forest was carried out under Mr. Taylor's supervision and may be regarded as a very fitting tribute to his memory. The proper display of

Epiphytic and Tree Ferns in this house is not only beautiful but also of great educational value. His experience was further enlarged by a visit a few years ago to the wonderful gardens on the French and Italian Riviera.

Mr. Taylor was greatly interested in the new Cactus House presented by Mrs. Sherman Hoyt and it was one of his great regrets, while he was in hospital, that he was not able to take any part in the planting and arrangement of the house.

The funeral was attended by the Director and a large number of present and past members of the Kew Staff and by representatives of the Ministry of Agriculture and Fisheries and H.M. Office of Works.

George Claridge Druce.—With the death of Dr. G. C. Druce, F.R.S., which occurred at Oxford on the 29th February, there passed away the most widely known and greatest of British field botanists of the last 50 years. Druce was born at Potterspury, Northamptonshire, on 23rd May, 1850. Apprenticed at the age of 15 to a chemist in Northampton he remained in that city after the completion of his apprenticeship and until he purchased a Pharmacy in The High, Oxford, in 1879. From that year till his death he made his home in Oxford. In his Flora of Buckinghamshire, Introduction, pp. cvi-cx (Arbroath, 1926), and in the Flora of Northamptonshire, Introduction, pp. cxxi-cxiii (Arbroath, 1930), Druce published some autobiographical details which would be well worth quoting if space permitted.

Few, even among those who have lived as long as Druce did, can have led a more active life. He travelled in many parts of the world. The success of his business and of his other investments showed that he possessed considerable financial ability. His services to the City of Oxford, to the University (as Curator of the Fielding Herbarium), to the Ashmolean Natural History Society, and to Freemasonry have been fully recognised. As a botanist he is best known for his series of excellent county floras (Oxfordshire, ed. i. 1886, ed. ii. 1927; Berkshire, 1897; Buckinghamshire, 1926; Northamptonshire, 1930), his editions of Hayward's Botanist's Pocket Book (editions 13–19), the List of British Plants (ed. i. 1908, ed. ii. 1928), and the Comital Flora of the British Isles (published during the week of his death). From 1903 until his death he was Secretary of the Botanical Society and Exchange Club of the British Isles, to the Reports of which he contributed many valuable, and often extensive, papers. With Prof. S. H. Vines he published accounts of the Dillenian Herbarium (Oxford, 1907) and of the Morisonian Herbarium (Oxford, 1914), both based on collections in the possession of the University of Oxford.

Many honours were awarded to Druce, of which the degrees conferred on him by the Universities of Oxford and St. Andrew's and the Fellowship of the Royal Society were probably most appreciated. He always enjoyed a wide range of popularity, and at times seemed

to court it, yet those who knew him intimately realised the essential simplicity of his character which was, indeed, obvious in the unaffected nature of his home life. Druce did not suffer fools gladly, but he always gave the best help he could to any who sincerely desired it. The following words from the address of the City Rector at the funeral service are the concise truth and bear repetition : " No matter from what angle one might look back over the long career of Dr. Druce, no matter by what criterion one might examine and appraise its story, there was no denying that throughout its course it was that of an exceptional man—exceptional in personality, in vision, in intellectual endowment, in insatiable passionateness of interest, in heroic independence of circumstance, in manifold and outstanding achievement " (*Oxford Times*, 4.3.32.).

It is understood that Druce's extensive collections of specimens and books are to remain at Oxford and be accessible to *bona fide* students. But Oxford without Druce will never be quite the same.

W. B. T.

Sixth International Botanical Congress.—The following note has been received from the Secretary, Dr. M. J. Sirks : " According to a decision by the Fifth International Botanical Congress at Cambridge in 1930, the Sixth Congress will be held in Holland in 1935. An Executive Committee has been formed, the President of which is Professor Dr. F. A. F. C. WENT (Utrecht), while Professor Dr. J. C. SCHOUTE (Groningen) will act as Vice-President, Dr. W. C. DE LEEUW (Bilthoven) as Treasurer and Dr. M. J. SIRKS (Wageningen) as Secretary. The Committee has decided that the Congress will meet at Amsterdam, September 9th-14th, 1935. Scientific Societies are kindly requested to reckon with these dates in planning their own meetings."

Types of Vegetation in Southern Rhodesia.*—Very often, nowadays, a botanist may know little about forestry and a forester little about botany. This is not true, however, of Mr. J. S. Henkel, Chief of the Division of Forests, Southern Rhodesia, who has published a very readable and interesting account of the vegetation of that region. As a forester he has had exceptional opportunities of studying the flora over considerable areas of the colony, and this valuable paper is the result of 11 years' observations. Although there are no really high mountains with subalpine vegetation, such as in East Africa, the distinct types of soil give rise to very marked vegetation formations.

The soils are grouped under four main heads as follows :— (1) the red clay soil (2) granitic soil (3) sandy soil and (4) the black soil of the vleis and plateaux, the last so painfully familiar to the motorist there and in South Africa as " black turf." It is this soil

*By J. S. Henkel, Chief, Division of Forests, Southern Rhodesia ; Proc. Rhodesia Scientific Association, xxx. pp. 22, with 5 maps (1931).

which makes road travel in Rhodesia so difficult in the rainy season. On the red soil various species of *Acacia* are dominant; on the granite *Parinarium*, *Protea* and *Faurea*, whilst a characteristic plant on the granite kopjes is the interesting "resurrection plant" *Myrothamnus flabellifolia* Welw.; on the sandstone soils the beautiful *Terminalia sericea*, *Burkea africana*, and *Brachystegia* spp. are the dominant trees. The black soil is characteristic of the "vleis" and is usually devoid of trees. It occurs mainly in those places where the subsurface drainage is poor and becomes water-logged during the rains. This soil carries a heavy crop of coarse grass sometimes as high as 15 ft. Alluvial soils are not extensive owing to the steepness of the river grades, but "pockets" of alluvium are sometimes found in the middle veld at the entrance to river "poorts"; such places, it is surprising to learn, are frost-hollows, and the occurrence of early or late spring frosts is actually the cause of the absence of many species of trees from these otherwise favourable localities. Frosts occur in the high and middle veld, and are often very severe. There is a frost line in both the Zambesi and Limpopo valleys, and it is traceable by the boundary of the "Mopane" and *Hyphaene ventricosa*. In the low veld alluvial soils are more common and it is this deposit that carries the dominant "Mopane" *Copaifera mopane* Kirk, which is so abundant from the foot of the Zoutpansberg in the Northern Transvaal to the Lundi River (*see K.B.* 1931, 227).

One of the most interesting of Mr. Henkel's statements relates to the effect of the advent of Europeans, previous to which the country supported immense numbers of wild animals. Huge herds moving about caused tracks which prevented or limited the spread of fires during the dry season. Since the reduction in numbers of big game, annual fires have become a serious biotic factor, and have destroyed vast tracts of valuable timber. There are now hundreds of square miles covered with short coppice growth which formerly carried a forest of large trees.

Motoring through Southern Rhodesia one finds parts of the roads "made up" with soil taken from neighbouring termite heaps. These vary in size according to situation, from small and inconspicuous heaps to huge mounds in the forest having a diameter of 60 ft. and a height of 20 ft. They carry a very interesting flora, in fact a new flora as compared with that surrounding them, and sometimes very large trees which appear to be of considerable age.

Besides Contour, Temperature and Rainfall maps there is a well executed provisional map of the vegetation types of Southern Rhodesia, an enlarged edition of which is available. To those who, like the present reviewer, have only visited Rhodesia for a short time in the dry season and have found the vegetation of great interest, this paper by Mr. Henkel will be very valuable indeed, especially as it is characterised by an almost entire absence of the formidable phraseology and terms with which many ecologists find it

necessary to arm themselves, but which often serve only to cloud and obscure the more interesting facts associated with the study of vegetation. J. H.

Horticultural Practices.*—This book, intended primarily for the use of amateur and professional gardeners in the Bombay Presidency plains, has been written by men who are practical horticulturists as well as trained scientists. A surprisingly wide field has been covered for so small a work and the treatment of every part of the subject appears to be adequate. Space has been saved by the rigid exclusion of all illustrations. Though it cannot compare in size and appearance with Firminger's "Manual," the last edition of which was issued in 1904, it has the advantage of being up to date and practical.

A species new to the European flora.—Mr. L. C. Pinatzi, of Athens, has forwarded to the writer a specimen which has been determined as *Valerianella orientalis* (Schlecht.) Boiss. et Balansa. The specimen was collected on Mt. Parnes, Attica, at 500 m., in April 1924, and the species was found there only on that occasion. *V. orientalis* was originally described by Schlechtendal (Linnaea, xvii. 126 : 1843) as *Fedia orientalis* from material collected "in lapidosis collinum pr. Aleppo, d. 19, April. leg. Kotschy." Boissier and Balansa (Boiss. Diagn. ser. 2, ii. 120 : 1856) removed the species to *Valerianella* (Sect. *Locustae*) and Boissier (Flor. Or. iii. 103 : 1875) retains it in this genus but places it in the Section *Cornigerae*. The species must not be confused with *Valerianella leiocarpa* O. Kuntze var. *orientalis* O. Kuntze (*Dufresnia orientalis* DC., *Valerianella Dufresnia* Bunge in Boiss. Flor. Or. iii. 109 : 1875).

V. orientalis (Schlecht.) Boiss. et Balansa is known from Asia Minor (Troas, Lydia, Pamphylia), Syria, and Palestine. It is well known that the Greek flora is taxonomically closely related to that of Asia Minor and the occurrence of *V. orientalis* in Greece is simply an addition to the many known examples of the same species growing on both sides of the Aegean Sea. W. B. TURRILL.

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*A Hand Book of Horticultural Practices, by G. B. Patvardhan and G. B. Deshmukh. Published by Prof. G. B. Patvardhan, Balwant Bhuvan, Deccan Gymkhana, Poona No. 4, 1931, pp. xvi + 190. Price : Rs. 1-12-0.

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